THE Soybean Digest

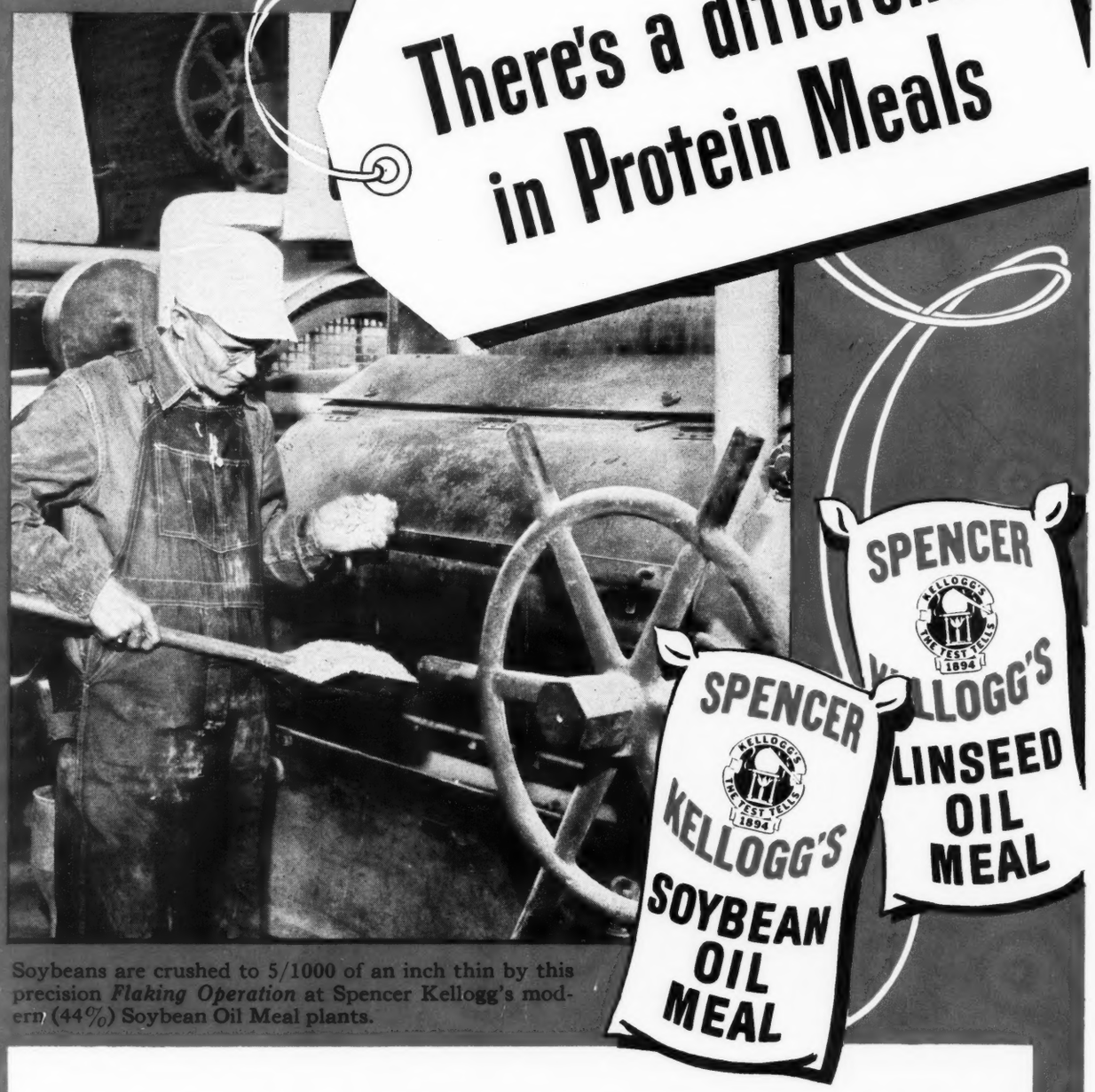
Official Publication

OF

THE AMERICAN SOYBEAN ASSOCIATION

VOLUME 6 • NUMBER 1 • NOVEMBER • 1945

There's a difference in Protein Meals



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PROCESSORS OF MEALS – NOT FEED MIXERS

THE Soybean Digest

REG. U. S. PAT. OFF.

GEO. M. STRAYER, Editor KENT PELLETT, Managing Editor

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IN THIS ISSUE

Whatever's the BEST BAG FOR YOUR USE

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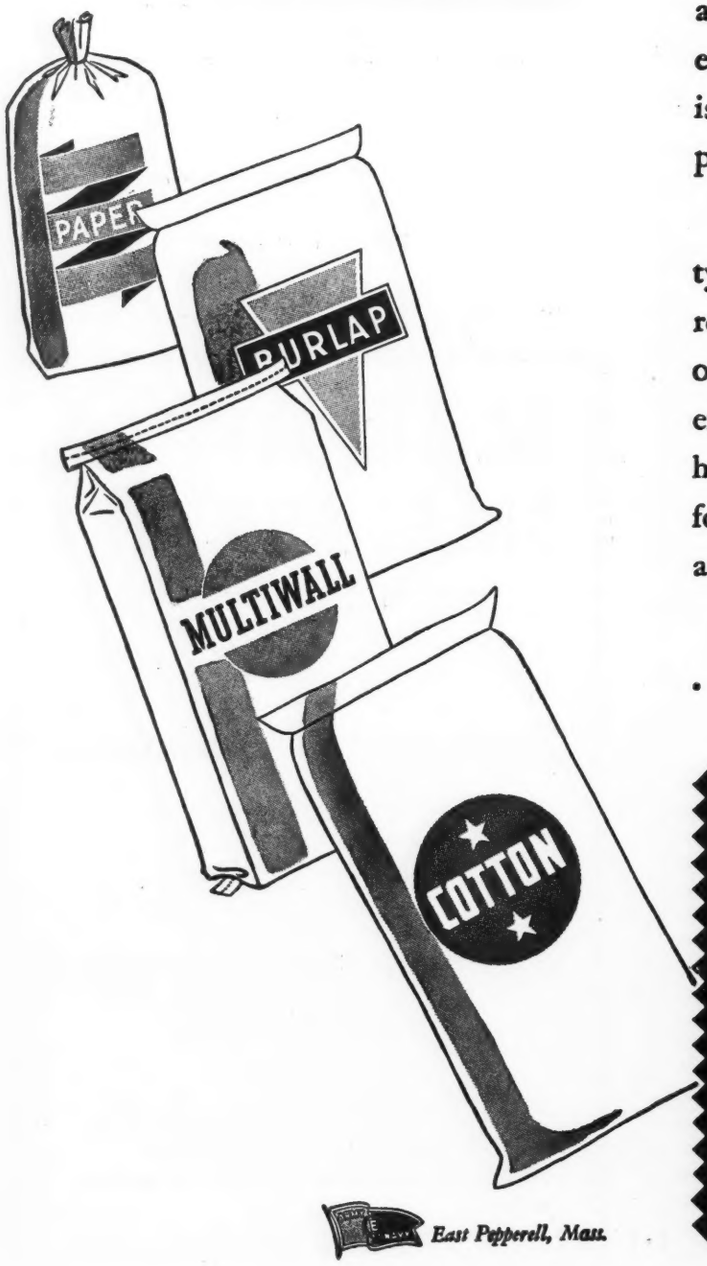

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BETTER BAGS SINCE 1858

It All Depends on the Price Some pessimistic reports concerning the possible future trend of soybean production have come to the editorial desk during recent weeks.

A poll of the nation's farm editors by E. R. McIntyre of the USDA's press service indicates that the editors forsee a national soybean acreage of 10.8 million by 1950 compared with 14.5 million acres in 1943.

Wallace's Farmer & Iowa Homestead predicts that Iowa acreage may be cut in half when and if the prewar price relationship between soybeans and corn is restored. Incidentally, this prediction was made before harvest of the 1945 soybean crop, which came out of the fields in remarkably good shape as compared to the wettest Iowa corn crop on record.

Reports from *Digest* correspondents in leading soybean states reveal uncertainty and some bearishness toward 1946 acreage pending announcement of the government's program.

Farmers won't continue to grow soybeans except at a profit, whatever other advantages they may have. Until the government's program is announced no intelligent forecast can be made of the trend of soybean production in the years ahead.

We know that a continued large acreage is needed in 1946 as least. As the *Soybean Digest* goes to press a conference is being held in Chicago for consideration of the 1946 soybean program. This is an open meeting of producers, processors, warehousemen and others with the Production and Marketing Administration of USDA. It is to be hoped that the resulting program will intelligently consider all factors involved. Watch for a complete report of this conference in the December issue.

When a Farm Depression? A serious farm depression may be expected within 2 years and it will be more or less permanent, says Theodore Schultz, University of Chicago agricultural economist.

Even though our population is larger than it was at the start of the war and workers are jingling more money in their pockets than ever before, Schultz does not think the country can absorb the huge supplies of farm products now being turned out.

But Wheeler McMillen, chemurgist editor of *Farm Journal,* sees more reason for optimism than otherwise. "I am personally planning on the belief that most of the years ahead in agriculture not only can be but are likely to be good years," he says.

Who is right?

Economists necessarily rely heavily on the past in making their predictions. But tremendous forces have been unleashed by the war, of which the atomic bomb is only the most startling example. Big developments, not accompanied by brass bands, have been underway in the Cornbelt for 10 years, For instance, hybrid corn, which a writer in *Harpers* says has effected a revolution. Soybeans are another example. Who predicted the effect of either on Midwest farming? Mechanization, of which the combine and the corn picker are perhaps the outstanding examples, has been rapidly changing the shape of things on the farm.

Is it not apparent that we must rapidly adjust ourselves to a new pattern of life?

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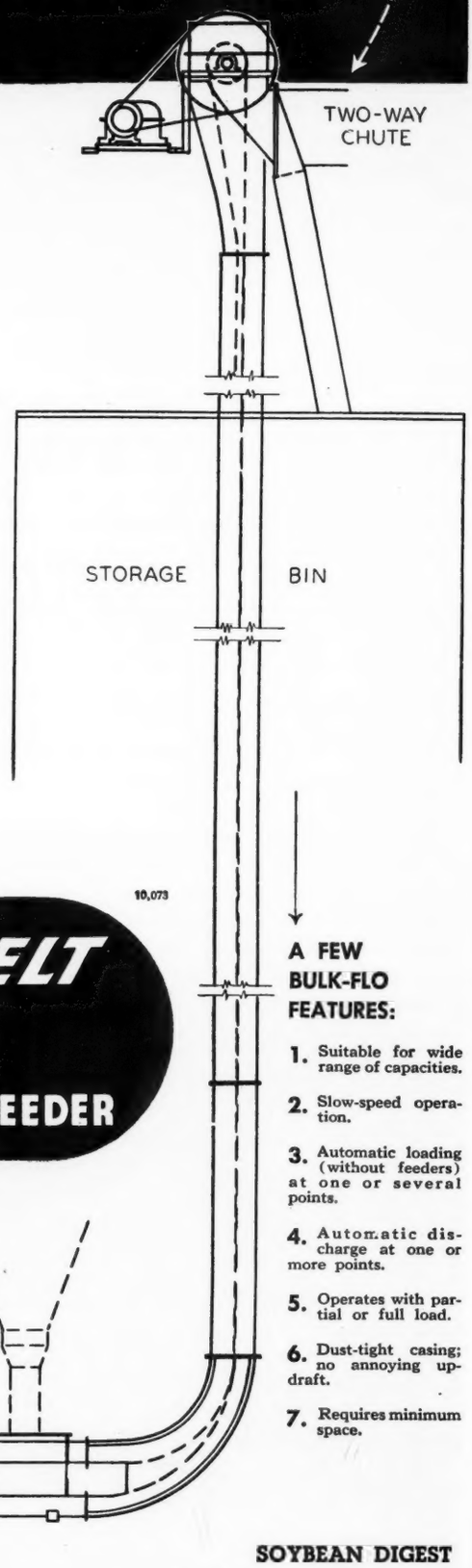

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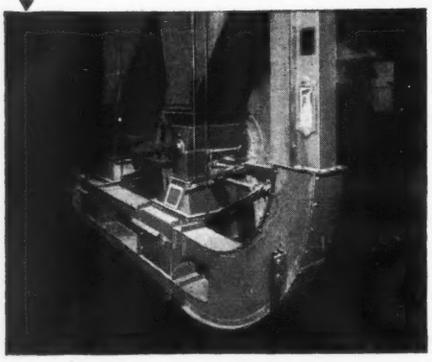
The photograph below and the sketch illustrate an L-type Bulk-Flo elevator-conveyor — 13 ft. horizontal and 45 ft. vertical centers — handling mineral mix from mixers to storage bin at Central Soya Co., Decatur, Ill.



New Kind of Exhibit

—Missouri Ruralist

A new type exhibit of soybeans featured the Audrian County Fair at Mexico, Mo., this year. Growers entered a combination of seed from last year's crop and plants from the 1945 crop. Winner was Earl Bell, Mexico. Raymond S. Snook, superintendent of the agricultural department of the fair, and his daughter, Violet, are shown in the picture.

NEW SOYBEAN DISEASE FOUND

A brand new soybean disease, known as brown stem rot and found to be widely distributed in Illinois this year has been reported by W. B. Allington, plant pathologist, U. S. Department of Agriculture, and Benjamin Koehler, professor of crop pathology, University of Illinois College of Agriculture, Urbana, Ill.

They described the disease as caused by a fungus which apparently develops with a cool season, usually appearing in the fall, and pointed out that the rot has seriously reduced yields in many fields.

"The interior of the lowest part of the stems is usually colored brown, and the color may extend almost to the top of the plant," they said. "The leaves usually blight suddenly, giving the field the appearance at times of a light frost.

"First discovered in the fall of 1944, there is no sure method of avoiding this disease at present. It appears to be in the soil and at times less severe in soybean fields planted after corn. Fertilization, particularly with potash, appears to have helped also in some cases."

—s b d—

SEND MILLION SOY LEAFLETS

Over 935,000 leaflets featuring the use of soy products in foods have been distributed by the New York State Emergency Food Commission during the past 3 years, reports Vera A. Caulum, senior nutritionist of the College of Economics, Ithaca, N. Y.

The Commission was sep up early in the "food emergency" by Gov. Thomas E. Dewey to sponsor an active program for the development of acceptable food products which would nutritionally replace scarce foods. Soy products received major attention.

Methods were developed for the production of soy sprouts and their home preparation in palatable and nutritious dishes. The Commission promoted the use of soy flour in bread and other bakery products to provide palatable foods with enhanced nutritional value.

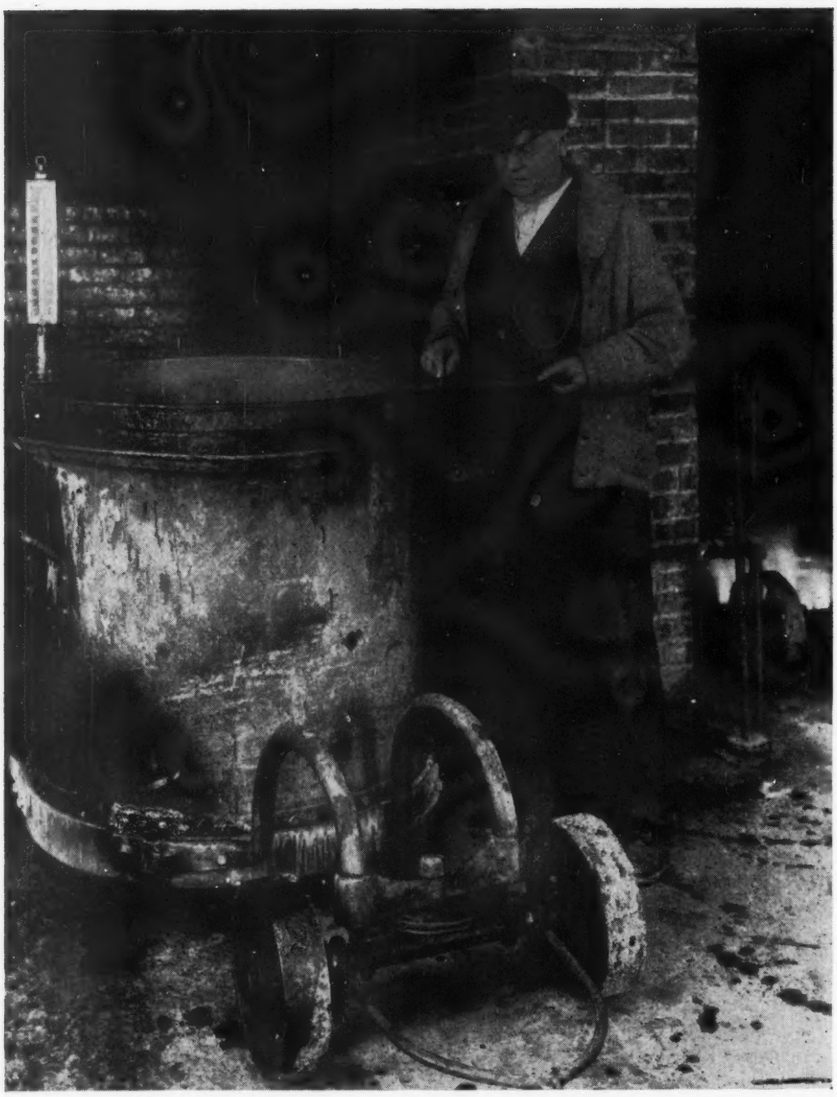
Among leaflets developed by the Commission are: "Sprouted Soybeans," by C. M. McKay; "Soybeans for Fifty," by Marian Neidert for restuarants and industrial and school cafeterias; "Introducing Soybeans," by Jeannette B. McCay and Marian Neidert; "Cookies with Soy," by Catherine J. Personius and Jeannette B. McCay; "Desserts with Soy," by Therese Wood and Jessie A. Boys; and "Manufacturers and Distributors of Soybean Products," a listing compiled by J. K. Loosli, vice chairman of the soybean committee.

—s b d—

CANADIAN GOAL WILL BE MET

Although oil-bearing crops, other than flaxseed, are of minor importance in Canada, indications are that Canadian farmers have planted the rapeseed and soybean acreage requested by the government in 1945. With the exception of soybeans in Ontario, commercial oilseed production is a wartime venture that has met with varying degrees of success.

Soybeans are produced almost exclusively in Ontario. This year's total acreage in that province may equal the 45,000 acres of 1944, of which 9,000 were for forage. Due to feeding on farms and to profitable alternative markets, a large proportion of the soybean production does not reach crushers. Crushers hope that from 400,000 to 500,000 bushels from this year's crop will be processed for oil.



Making a varnish "cook". The varnish oil and resin are cooked together at carefully controlled temperatures. This is a two drum kettle such as is used in many plants. The varnish maker is examining a sample.

RESEARCH
SUPPORTS THE SOYBEAN

● *This paper was prepared by members of the staff of Spencer Kellogg and Sons, Inc., who are among the largest producers of soybean products and leading exponents of industrial research. Their research laboratory is one of the oldest and most distinguished in American industry. Its head, Dr. Alexander Schwarcman, was recently awarded the Schoellkopf Memorial Medal for achievement in chemical research. In this paper the discussion of edible soybean oil is by Frank Mitchell; soy flour by H. A. Olendorf; industrial soybean oil by Edward H. Valance, and soybean oil meal by J. E. Johnson.*

IN RECENT years an accelerated interest has been shown in the development of the soybean as a farm crop, as a food and as a material in industry in the United States.

Since 1920, a tremendous concentration of scientific effort and research has stabilized the soybean's position as one of the rotation crops in the Cornbelt. This has been a result of untiring work performed by agricultural experimental stations in cultivating the best bean for any given farm area. It has been assisted by the work of chemists and scientists, both in and out of industry, who have and are developing a most formidable list of useful derivatives from both oil and the meal. It is the demand for these desired products that supports the market for the farmer's crop.

The oil, which comprises 18 to 20 percent of the bean, can be used in industry as a vehicle in paints, varnishes, enamels, and other uses, or it can be refined and deodorized to prepare high grade edible products. The oil meal is a valuable food, a wide variety of products being prepared from it.

EDIBLE SOYBEAN OIL

The problems of research in edible soybean oil are related to the processor's aims of producing a pure and wholesome product, palatable to the American taste, good in keeping quality and having desirable physical—i.e. melting point—characteristic for specific uses. Previous experience with other vegetable oils provided processes which were, with modifications developed in the laboratory, adaptable to soybean oil refining. New problems arose when the war forced certain other oils off the American market and it became necessary that soybean oil be given new characteristics that would enable it to replace them.

In the preparation of an edible soybean oil, there are two refining methods available, the continuous and batch system. The batch system consists of large tanks that hold from 20,000 to 40,000 pounds of oil, in which the oil is neutralized with a caustic solution. It is stirred and heated until the soap of the free fatty acids, lipoids and excess lye coagulate to form large flocs. The stirring is then stopped and the so-called "break" is allowed to settle to the bottom of the tank. The clear,

A Review of the Developments that Have Resulted in Much of the Increase in the Use of Soybean Products

neutral oil is withdrawn from the top and is then washed by stirring in appoximately 10 percent water. The mixture is then warmed and the agitation is stopped which allows the oil and the water to separate. The oil is then pumped to a bleaching kettle where fuller's earth and activated carbon are added. This mixture is stirred and heated to approximately 180° F. while, at the same time, being subjected to a vacuum which removes the last traces of water.

WINTERIZATION PROCESS

"Winterization" is a process originally designed to remove the solid fats from cottonseed oil which crystallize at low temperatures. This condition of crystallization caused manufacturers of salad oil and mayonnaise considerable trouble. To eliminate this undesirable condition, the cottonseed oil is refrigerated for several hours and filtered through a refrigerated press which removes the crystallized fats.

Although soy oil does not contain fats which exhibit crystallization at 32° F., the art of winterization is being applied by many soy oil refiners, who claim greater stability and less reversion as a result of such treatment.

Edible soybean oil is now used in three types of final products: (1) liquid salad oil, (2) shortening type oils which are solid at room temperatures and have a rather wide melting or softening range, (3) sharp melting solid fats.

If a salad oil is being prepared, it is transferred, after winterizing, to a vacuum kettle, heated and blown with steam for several hours. This process removes the distillable constituents and produces a light-colored, bland tasting salad oil.

Before December 7, 1941, cookie and candy manufacturers consumed millions of pounds of coconut oil annually because in its natural state coconut oil is a solid below 76° F. and completely liquid at temperatures above 76° F. Hydrogenated oils were prepared to function as a shortening, which is characterized by long-range melting point, i.e. starting to melt at 100° F. and becoming completely liquid at a temperature of 110 to 115° F. However, when a shortening-type vegetable oil was used by candy manufacturers, a tallowy sensation in the mouth was experienced. The body temperature was not sufficiently high to melt the fat completely. After December 7, 1941, our source of copra from the Philippines was blockaded and, as a result, there was no coconut oil available for any use except soap manufacturing; consequently, soybean oil was selected as a suitable liquid vegetable oil which could be transformed into a sharp melting solid fat.

It was the research laboratory's problem to discover how, by means of proper catalysts and by processing at various pressures and temperatures, soybean oil could be so converted. Moore, Richter, and Van Arsdel (1) conducted a series of hydrogenation experiments on cottonseed oil using a nickle catalyst and concluded that by the use of high temperatures and low concentration of catalyst it was possible to selectively convert linoleic to oleic acid. Other workers have correlated the work of Moore, Richter, and Van Arsdel and supplemented their investigation with additional information.

Bailey, Feuge, and Smith (2) found that the formation of stearic acid was repressed and the formation of "iso-oleic" acid was simultaneously favored by increasing the temperature, increasing the catalyst concentration, decreasing the pressure, and decreasing the agitation. They also pointed out that the method of activating the nickel catalyst had a marked effect on the degree of selectivity during hydrogenation. Through the continuation of the research of these fundamental principles of hydrogenation the problem was solved, and today hydrogenated soybean oil is used by candy and cookie manufacturers. In many instances it exhibits superior working and keeping properties to the more familiar coconut oil.

(1) Moore, Hugh K.; Richter, G. A., and Van Arsdel, W. B.—J. Ind. Chem. 9,451-62 (1917)

(2) Bailey, A. E.; Feuge, R. O., and Smith, B. A. Oil & Soap, 19,169-76 (1942)

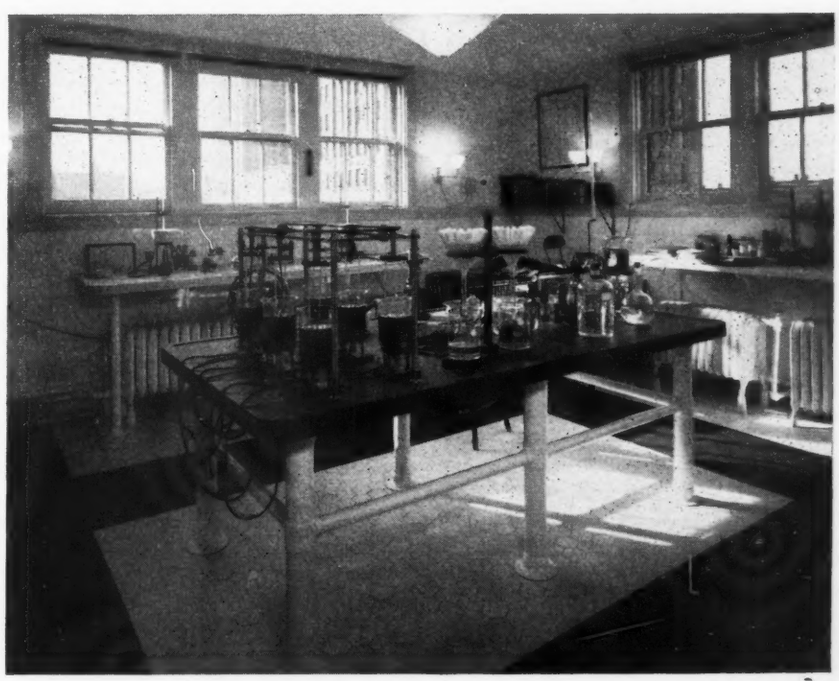
SOY FLOUR AND GRITS

Edible soy products are manufactured from specially selected and cleaned soybeans. There are three principal types designated as full-fat, low-fat, and defatted or practically fat-free. The table below is self-explanatory:

AVERAGE PERCENTAGE COMPOSITION OF VARIOUS TYPES OF SOY FLOURS

	Full-Fat Flour	Low or Medium-Fat (Expeller) Flour	Low-Fat (Defatted) Flour
	%	%	%
Moisture	5.5	5.0	7.0
Protein	40.5	50.0	52.25
Fiber	2.1	2.4	2.5
Ash	5.0	5.5	6.0
Fat	22.0	7.0	1.0
N.F.E. (non-starchy material)	24.5	30.0	31.5

Personal laboratory of Dr. Alexander Schwarcman, Spencer Kellogg & Sons, Inc.



When soy flour was first introduced to the American public there was great accompanying publicity about the wide useage of the soybean as a stable article of diet in the Orient. The soy products which were acceptable and had been used for centuries in the Far East, however, were not acceptable to the average American. It therefore, placed the responsibility on the American soybean processors, to create products which would be agreeable to the American palate, and which could be used successfully in food mixes.

EDIBLE PRODUCT IMPROVEMENT

Over the course of the last 10 years quite decided improvements have been made in finished edible soy products. These improvements have been made in the form of more accurate removal of the flavor and odor from the soybean and a better preparation for specific uses in mixed foods as requirements for these purposes were recognized.

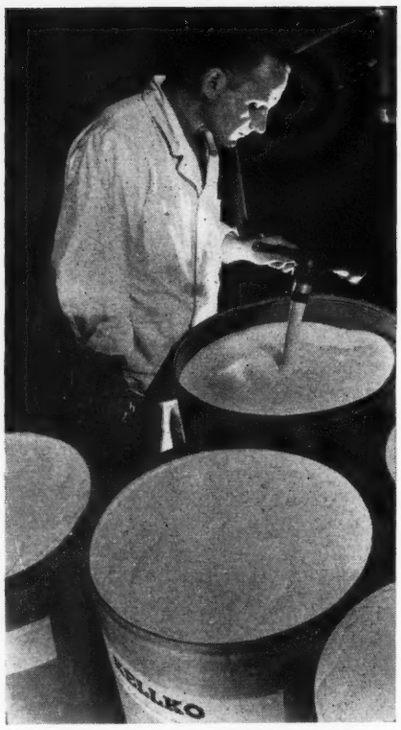
All types are used in bakery products, but there is a preference shown for the full-fat and also the defatted types over and above the low-fat type. Soy flour has come to be recognized as an ingredient in the bake shop, which creates more rich bakery products and adds protein fortification. It is easy to use. At this time a substantial portion of the soy flour produced for domestic consumption is going into bakery channels.

The packing house industry has used the low-fat and defatted types consistently for many years as a binder for sausages, special loaves, etc. In the days when canning of dog food was permitted that particular industry accounted for more than half of the low-fat products sold domestically. The splendid moisture absorption and retention qualities have been a decided advantage.

Soy products are very easy to use in baked goods, meat products, confections, dry soups, pancake flour, and other mixes. It has been quite well established that wherever milk, shortening, or eggs might be used there also could be used edible soy products.

Research on edible soybean products has been carried on by various organizations interested in promoting highly desirable proteins for food. Most recently considerable effort has been put forth to determine particular requirements for use in the bakery field and in dry soups, as well as in confections.

Many university and government organizations have also been doing a vast amount of research work with soybeans for many uses. This work includes projects designed to be of aid to soybean growers, and also projects to determine more facts about nutritional value. The Organoleptic Committee of the Soya Food Research Council in collaboration with the State of



Filling drums with shortening made from refined soybean oil.

Illinois carried on a test recently to determine continued flavor acceptance of soy flour in bread. During this test nearly 4 million meals were served with bread and rolls containing soy flour, and no taste fatigue was noticed.

Experiments carried on by authorities well-known in the research field have proven that the protein of the soy products when used as a supplement to wheat protein, renders very promising growth-promoting values. Glyciain, a protein fraction that represents most of the total protein of the soybean, contains 9 percent of lysine which is an essential and very valuable amino acid. It is known that soybean protein contains a certain percentage of all the 10 nutritionally essential amino acids.

Edible soy products present the most economical source of protein known today.

INDUSTRIAL SOYBEAN OILS

Research work in the field of industrial soybean oils is largely connected with the needs of the paint and varnish and plastics industries which use what are called drying oils, of which the most prominent is linseed oil. The problem has been to apply chemical techniques to soybean oil and thereby endow it with more desirable properties—especially more rapid and thorough drying.

The chemical composition and properties of soybean oil place it in a semi-drying classification among vegetable oils. Its unsaturated fatty acids are principally oleic and linoleic. It contains approximately three percent of isolinolenic fatty acids. Therefore, the oil is used both as a drying oil and a non-drying oil. In the last 10 years through the development of phenolic resins and also due to the manufacture of alkyds, the use of special soybean oils in protective coatings has increased rapidly.

Its principal consumption today, in the technical grades, is in the manufacture of high priority alkyds. Alkyds are synthetic resins—a highly important ingredient of varnishes, enamels, and industrial finishes. A most prominent example is the gleaming white enamel finish of domestic refrigerators. Highly refined, alkali-treated soybean oil has many unusual characteristics. Its original color is extremely light and when polymerized with a varnish grade of linseed oil, it gives unusual color retention in white enamels. It also has the advantage of reacting slowly during the process of making alkyds and producing them with very low acid value.

There are several grades of oxidized soybean oil of varying viscosities used by the technical industry, all very light in color—from Z to Z5 Gardner-Holdt viscosity, with acid values of 4 to 7. These are used in the paint industry. In grinding vehicles, these oils speed up wetting of pigments, give excellent flow and leveling qualities. They are ideal to add in small quantities to paints and enamels. One of their most important uses is in caulking compounds where they give superb results.

DRYING TIME

Considerable research work has been done on improving the drying time of soybean oil and also its bodying time in the varnish kettle. Several different improvements have been made and in different ways. The basic idea behind these improved soybean oils is to make a technical grade, light color soybean oil which will polymerize like linseed and dry very much like linseed.

Soybean oil's exceptionally fine non-yellowing characteristics and its fine brushing and flowing qualities would have long ago earned it a prominent place in finishes had it not been handicapped by poor drying and slow polymerization. Polymerizing soybean oil has been a notably uneconomical time and labor consuming job, with the end product very high in acid value. In fact, the very high acid values obtained eliminated soybean oil from use in many products.

Soybean oils have been studied carefully in the research laboratories of the oil producing companies with a view to discovering processes for removing these disadvantages. A long series of experiments, requiring months of time and the efforts of many workers, have been conducted.

Spencer Kellogg and Sons laboratories have developed soybean oils which will

body as rapidly in the varnish kettle as the ordinary high quality varnish linseed oil and the so-called fast bodying linseed oils. In other words, soybean oil of the special type can be cooked in the varnish kettle in 5½ hours and 3½ hours, to a very heavy body with normal acid values. These oils, when formed into varnishes and enamels, dry quite comparably to the varnish grade linseed oil.

NON-DRYING SOYBEAN OIL

Applied research has also found an additional use for soybean oil by working to a precisely opposite end—that of creating from it a perfect nondrying oil. This has been accomplished by the discovery of synthetic processes which incorporate hydroxyl groups into its chemical composition. This change also makes the oil soluble in alcohol. It is used as a substitute for castor oil in coated fabrics and as a plasticizer in different varieties of lacquers.

The oil research chemist has only scratched the surface on the possibilities of further developments in technical grades of soybean oil.

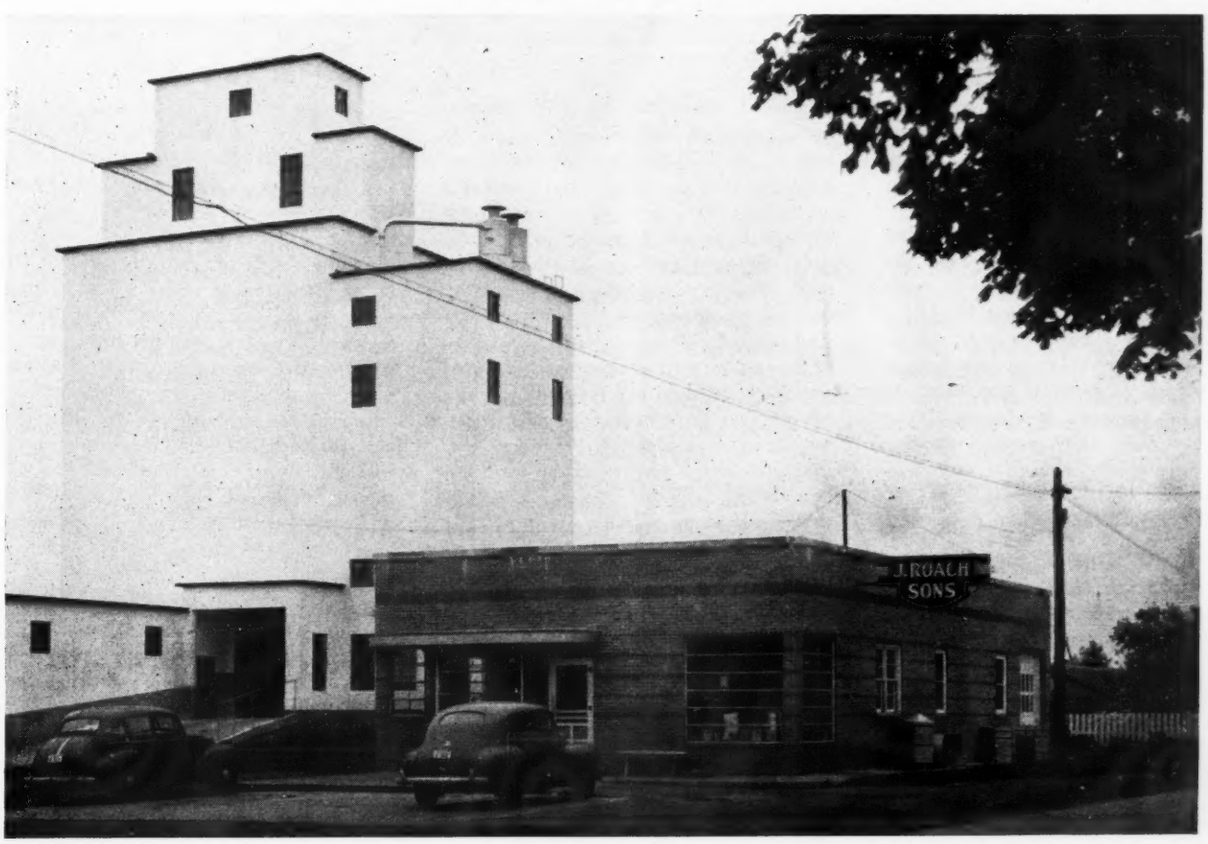
A large section of the American public is still accustomed to thinking of soybean oil meal as something which is made into a plastic and in turn formed into hundreds of different articles ranging from automobiles to household utensils. However, the fact remains that by far the greatest proportion of soybean oil meal (the term "oil meal" indicates the oil has been removed) is used as a protein concentrate in the feeding of all types of farm animals. Research conducted by soybean processors, feed manufacturers and college agricultural experiment stations all over the country has worked towards the end of finding better methods of production with the ultimate goal of producing a better product for the feeder. Production methods are constantly being improved and newer and better ways of oil extraction are being developed. The early hydraulic press system gave way to the expeller or screw-press method which in turn is now being replaced in many instances by the still more efficient solvent extraction method which removes all but approximately one-half of one percent oil from the bean. After the oil has been removed from the flaked soybeans every trace of solvent is distilled from the flakes which then undergo additional mechanical processing and heat treatment to toast the meal properly, thus providing maxmium efficiency of the available proteins in the meal. Direct control of the manufacturing processes by trained technicians and chemists assures a quality product. Meal produced by this new method is sold under the name of 44 percent protein soybean oil meal and is sometimes called new process soybean oil meal. Some feed manufacturers, who maintain their own research laboratory and experimental feed lots state that this 44 percent protein soybean oil meal is preferred by them because of its greater uniformity and higher percentage of digestible nutrients.

The question is constantly being asked as to the position soybeans will have in the postwar economy of the American farmer. It vitally concerns the soybean grower, the processor and others who have a deep interest in the soybean industry. The processors have full confidence that the growers will deal wisely as they always do with the subject of growing soy-

(Continued on page 21)

J. ROACH SONS HAVE OPENED NEW FEED MIXING PLANT

When J. Roach Sons, Inc., Plainfield, Iowa, suffered a disastrous fire, their second one, in August 1944, they decided their next elevator and feed mixing plant should be a completely fireproof structure. The new plant with 40,000 bushels capacity was formally opened recently. Howard L. Roach, who is also president of the American Soybean Association, is president of the firm. He is associated in the business with his father, E. A. Roach, his brother Robert and his cousin James. The firm was one of the first to offer soybean oil meal as a livestock feed in Iowa, has set up in cooperation with Iowa State College a solvent extraction soybean processing mill which will soon be in operation.



INDUSTRIAL UTILIZATION of Soybean Oil

By DALE V. STINGLEY, Armour Chemical Division

WITH very few exceptions, the industrial use of soybean oil received little direct encouragement during World War II. This was due, not to prejudice on the part of industry, but to the importance of soybean oil as an edible fat which prompted wartime restrictions on its use in the industrial field.

The farmer who raised soybeans and the crusher who produced soybean oil have felt no immediate bad effects from this, but if this situation had not existed, wartime utilization of soybean oil for industrial purposes would have undoubtedly reached an all time high and the immediate postwar industrial market for soybean oil would have been correspondingly broader.

In the fat and oil picture soybean oil is an "in between" oil, that is, it is neither drying nor non-drying but belongs to the class of oils commonly designated as semi-drying. If we take a pessimistic view, this is discouraging but, actually, in the light of modern technological developments we should be encouraged, since in soybean oil we have a readily available raw material that, with slight modification, can be made suitable for either drying or non-drying uses, thus permitting the widest industrial utilization.

When we consider that the U. S. production of soybean oil has grown from approximately 1 million pounds annually in the early twenties to almost 1¼ billion pounds in 1944, and that most of the growth has occurred in the last 5 years, there can be no doubt in our minds regarding its economic importance. If we consider further that research is time consuming and that industrial acceptance of new raw materials does not come overnight, we begin to realize how far soybean oil has progressed up the industrial ladder.

DALE V. STINGLEY

Table I shows the reported industrial consumption of soybean oil over the 10 year period 1935-44. This indicates a remarkable increase in industrial acceptance up to 1942 when soybean oil was largely reserved for edible purposes. In 1941, the peak industrial year for soybean oil, almost 100 million pounds were consumed, representing an increase in industrial consumption of 440 percent over 1935, and 22 percent of total consumption. By 1944 wartime restrictions had reduced industrial consumption to 54 million pounds, representing an increase of only 250 percent over 1935 and only 5 percent of the total soybean oil consumed.

Table II shows a comparison of total industrial use of fats and oils, versus total use and percentage of soybean oil, by major industries for 1941, the latest year of normal distribution. These statistics are of more than historical interest in that they give us a foundation for analyzing possible future industrial demands.

In 1941 soybean oil, representing approximately 10 percent of our fats and oils supply, was used only to the extent of 2.5 percent in industry. Indications are that this same ratio will not hold in the postwar period when restrictions on industrial use have been lifted since technological advances have greatly widened the scope of usefulness of soybean oil, and at the proper price level industrial consumption should show a substantial increase over past figures. This is not necessarily a matter of opinion if we take the time to analyze the use of soybean oil industry by industry, and weigh the effects of technological advances on probable postwar industrial usage.

SOAP

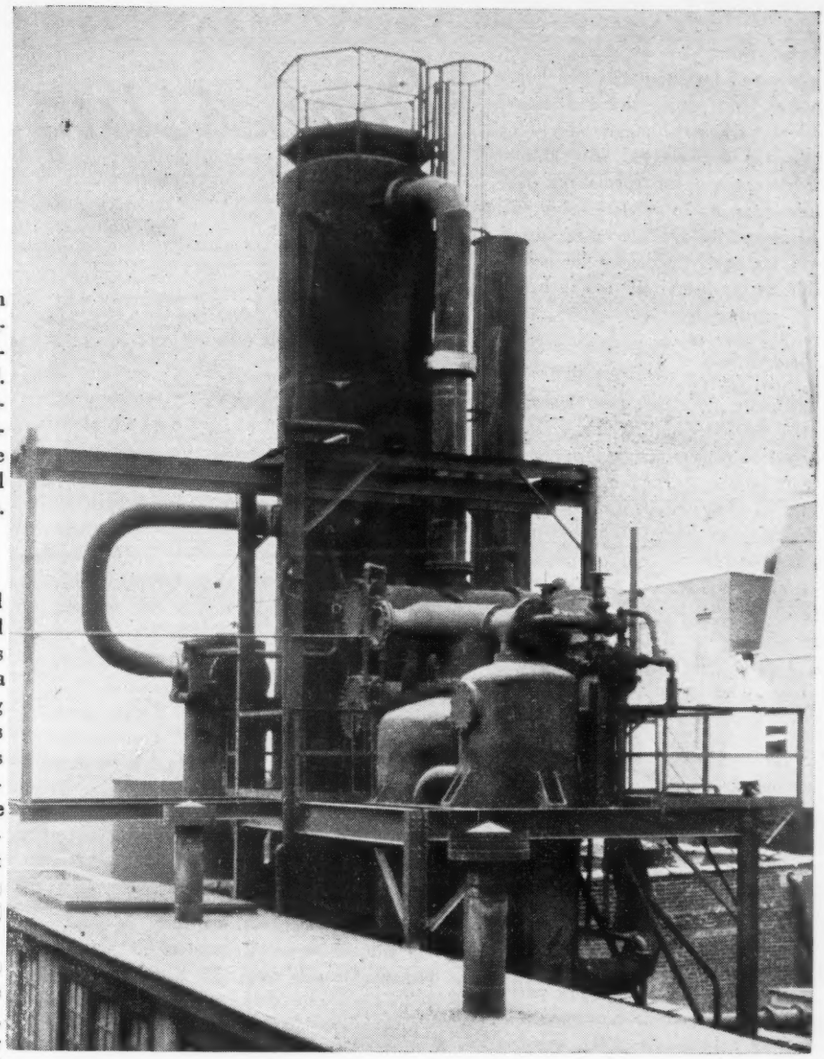
Fats and oils used in the soap industry fall naturally into three groups: (1) High lauric oils, (2) Non-drying fats and oils, (3) Vegetable drying and semi-drying oils. The demand for groups (1) and (2) oils far surpasses the need for group (3) oils since this latter group is used mainly in the production of potash jell and liquid soaps. In the past, substantially all of the soybean oil used in soap has been used in potash soaps which constitute a minor volume of the total fats and oils consumed in soap and, since soybean oil does not contain lauric acid or any acids of comparable nature, the largest field for expansion of the use of soybean oil in soap is largely limited to group (2). Techni-

TABLE I. — SOYBEAN OIL USAGE (1935-1944). 1,000 lbs.

INDUSTRIAL USAGE	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944
Soap	2,549	5,023	10,274	10,897	11,177	17,612	24,737	31,510	15,428	3,258
Paint & Varnish	13,003	14,471	16,143	15,183	21,720	29,828	41,549	25,307	20,462	19,105
Linoleum & Oilcloth	4,816	2,886	934	3,605	6,438	7,254	7,666	480	273	48
Printing Ink	52	62	80	59	62	82	255	141	48	23
Misc. Industrial	1,665	3,405	3,038	5,340	9,332	16,538	23,445	13,684	43,075	31,767
TOTAL INDUSTRIAL	22,085	25,847	30,469	35,084	48,729	71,314	97,652	71,122	79,286	54,201
EDIBLE USAGE										
Shortening	52,452	113,897	90,798	137,133	201,599	212,317	215,967	335,555	568,405	620,257
Margarine	1,740	14,262	31,793	39,885	70,822	87,106	75,634	133,346	198,020	211,105
Other Edible Prod.	9,421	21,598	15,530	11,280	32,345	39,980	47,976	69,857	124,562	150,192
TOTAL EDIBLE	63,613	149,757	138,121	188,298	304,766	339,403	339,577	529,758	890,987	981,554
TOTAL USAGE	85,698	175,604	168,590	223,382	353,495	410,717	437,229	600,880	970,273	1,035,755

Source—Bureau of Census and Bureau of Agricultural Economics.

● *Methods for processing soybean oil for industrial usage include solvent separation, fractional distillation, modification with condensation agents, conjugation, dimerization and others.*



Armour & Co. refractionating tower.

cally, this presents no particular problem since hydrogenated soybean oil is as completely acceptable for soap making purposes as the fats and oils now being used. Economically, however, the lack of hydrogenating facilities and cost of hydrogenation are factors which, in the immediate future at least, may hinder any substantial increase in the use of soybean oil in soap.

DRYING OIL INDUSTRIES

The problem of utilizing soybean oil in the paint and varnish, linoleum and oilcloth and printing inks industries is much the same; namely, conversion of a semi-drying oil to a product with drying properties. Extensive research programs have been directed to this end, and various methods have been developed to accomplish this purpose. Since many of these methods are both technically and economically sound, it is logical to anticipate that a marked increase in the use of soybean oil in the drying oil field may be expected in postwar years.

Existing methods for processing soybean oil for use in the drying industries include solvent separation, fractional distillation, modification with maleic anhydride or other condensation agents, replacement of glycerol with polyhydric alcohols to form synthetic oils, conversion to alkyd resins, conjugation, dimerization etc.

Solvent separation and fractional distillation are much alike in that both processes require elaborate equipment installations and that both operate on the principal of segregation. Solvent separation as presently practiced effects a separation of the glycerides, and fractional distillation a separation of the component fatty acids of soybean oil.

Products from the solvent separation process are a drying fraction useful for protective coatings and other drying oil uses, and a non-drying fraction which is more acceptable for edible purposes than the original soybean oil. This process to date has not been widely exploited, but in the postwar period it is expected that a substantial increase in the amount of soybean oil consumed by the drying industry will result from this development.

In the fractional distillation process separation of the component fatty acids of soybean oil can be closely controlled, and when employed in conjunction with hydrogenation, esterification and other modifying processes makes available a wide range of products suitable for all types of industrial applications ranging from rubber, lubricants and soaps to synthetic resins, protective coatings, linoleum and printing inks. The drying fatty acid fraction is particularly desirable for alkyd resin production in view of its inherent color stability and rapid drying characteristics. Re-esterified with pentaerythritol, a synthetic oil with superior color retention and dry for oleo-resinous varnishes, printing inks and paints is produced. Commerical operation well established prior to the war has proved the merits of fractional distillation, and it is anticipated that industrial demands for these products will rise sharply as reconversion to peacetime industry proceeds.

The practice of treating soybean oil with various modifying agents to improve its drying properties usually requires no special equipment in addition to that found in any well equipped oil refinery or varnish and resin plant. For this reason a continued growth in this field may be expected as many oils of this type have been widely accepted by the drying oil industry.

In this type of processing should be classed maleic anhydride treatment, a well established process, soybean alkyds which have been produced in enormous volume

TABLE II. — 1941 Use of Fats and Oils. 1,000 lbs.

	Estimated Total Fats & Oils Used	Soybean Oil Used	Percent Soybean Oil Used
Soap	2,833,857	24,737	1.1%
Paint and Varnish	886,189	41,549	4.7
Linoleum and Oilcloth	136,840	7,666	5.6
Printing Ink	29,319	255	0.9
Miscellaneous	546,024	23,445	4.3
TOTAL	3,932,229	97,652	2.5%

Sources—Bureau of Census and Bureau of Agricultural Economics.

during the war under Navy Specification 52-R-13 and which are expected to continue in demand for industrial and household finishes, and conjugated and dimerized products which, although widely extolled, have so far received only a minimum of acceptance for specialized uses. Other developments in related fields such as improvements in varnish resins, driers, etc., have materially widened the field of utilization of soybean oil as such, for protective coatings.

MISCELLANEOUS

A great many industrial uses of soybean oil outside the soap and drying oil fields are grouped in census statistics under the term miscellaneous. The total usage in this group as indicated in Table II is not inconsiderable, as actual reported usage is well in excess of 500 million pounds of fats and oils annually, and because of the diversified industries included and the poor coverage of this group in the Bureau of Census statistics, it could well approach 750 million pounds or more in postwar years.

Major fat and oil uses classed in the miscellaneous group include caulking and glazing compounds, rubber compounding, metal working compounds, lubricants, leather and textile processing, core oil, rust preventatives, insecticides and disinfectants, waxes and polishes, cosmetics and toiletries, candles, etc. No figures are available on these individual industries, but it is estimated that the greater portion of the 23 million pounds reported in the miscellaneous column for 1941 was consumed in core oil, with lesser amounts in caulking and glazing, rubber compounding and still smaller quantities in the other industries named. No general rule can be laid down on the requirements of this group, but such processes as hydrogenation and sulfonation are commonly employed and such raw materials as corn oil, olive oil, peanut oil, mustardseed oil, linseed oil and other vegetable oils constitute the bulk of the fats and oils consumed. This field could absorb a much higher proportion of soybean oil than it has in the past, but this can only be accomplished by intensive technical sales promotion on the part of soybean oil producers and distributors.

How much soybean oil can be consumed in industrial outlets in the postwar period and how much will be consumed are not necessarily the same thing. Statistics show the industrial need for fats and oils; research has solved many of the technical problems involved, but economics will really solve the problem since in the final analyses soybean oil will be used in a competitive market where fats and oils are much more interchangeable than they were prior to the war, thanks to the research chemist.

THE SOYBEAN *Processing Situation* 1945-46 Season*

By EDWARD G. SCHIFFMAN
Farm Credit Administration

THE RAPID increase in the number and capacity of soybean oil mills which began during the early years of the war was continued during the 1944-45 season and promises to continue through the 1945-46 season, although at a somewhat reduced rate.

On October 1, 1945, there were 116 soybean oil mills in operation in the selected states which this report covers, with an estimated annual capacity, based on 330 days of operations, of approximately 154 million bushels. (Table I.) Of this capacity, 41 million bushels or 27 percent was of the solvent type. In addition there were nine mills under construction. The capacity of these new mills under construction plus the additional capacity under construction by mills already in operation amounted to approximately 16 million bushels bringing the total capacity in operation and under construction to 170 million bushels. Of this total, 51 million bushels or 30 percent is of the solvent type.

In the annual capacity data used here it is assumed that mills under conditions which are likely to prevail during the 1945-46 season will be able to operate 330 days if sufficient supplies of beans are available. This period is arbitrary in that individual mills were not asked how many days they planned to operate or could operate during the 1945-46 season. In previous studies a period of 346 days per year was commonly used as the basis for computing annual capacity which, under the scarcity processing capacity situation that existed during the war years, appeared justified. With the greatly increased capacity now available it was considered more realistic to use a period of 330 days. Daily capacity figures can be obtained by dividing the annual data by 330 days.

It is interesting to observe that despite the greater efficiency of the solvent method of extraction there was under construction on October 1, 1945, screw press or expeller capacity of approximately 6 million bushels. The trend toward solvent equipment is obvious, however, as on October 1, only 27 percent of the capacity in operation was of the solvent type, whereas 64 percent of the total capacity under construction on this date was of the solvent type. Several processors are now developing plans for changing over from mechanical screw press operations to solvent ex-

*The author wishes to express his thanks to the members of the soybean processing industry whose excellent response to inquiries concerning capacity and related matters provided much of the basic information for this article.

TABLE I. — Estimated Annual Processing Capacity of Soybean Oil Mills in Operation and under Construction, By Type of Equipment, October 1, 1945, Selected States*

State	Capacity in Operation			Capacity under Construction			Total Capacity in Operation and under Construction		
	Screw press or expeller equipment†	Solvent equipment	Total	Screw press or expeller equipment	Solvent equipment	Total	Screw press or expeller equipment†	Solvent equipment	Total
	1,000 bushels								
Delaware		91	91					91	91
Illinois	41,879	17,647	59,526	2,310	1,099	3,409	44,189	18,746	62,935
Indiana	10,907	4,752	15,659		1,815	1,815	10,907	6,567	17,474
Iowa	17,695	11,587	29,282	1,890	769	2,659	19,585	12,356	31,941
Kansas	3,004	–83	3,087				3,004	–83	3,087
Kentucky	3,968	1,419	5,387				3,968	1,419	5,387
Michigan	277	792	1,069				277	792	1,069
Minnesota	2,383		2,383				2,383		2,383
Missouri	5,392		5,392	528		528	5,920		5,920
Nebraska	2,158		2,158	99		99	2,257		2,257
New York	5,013		5,013		1,980	1,980	5,013	1,980	6,993
North Dakota	528		528				528		528
Ohio	17,735	5,066	22,801		4,290	4,290	17,735	9,356	27,091
Pennsylvania	223		223				223		223
South Dakota	495		495				495		495
Wisconsin	1,452†		1,452	792		792	2,244†		2,244
Total	113,109	41,437	154,546	5,619	9,953	15,572	118,728	51,390	170,118

*Annual capacity based on 330 days of operations.
†Includes capacity of one hydraulic press equipped mill.

tractor equipment, and some have already made the change and are only awaiting an opportune time to discontinue their screw press or expeller operations. Many others, however, have made no such plans with the result that one of the most difficult adjustment problems confronting the industry will be that resulting from the great differences in efficiency and therefore competitive position of mills using the two different types of equipment.

On the basis of October 1 indications, a soybean crop of approximately 197 million bushels can be expected this year (Table II). Of this amount it is estimated that 163 million bushels will be available to mills for processing. This figure obviously can only be considered a rough approximation and should be used accordingly. Final production data which are basic to any reasonably accurate estimate of the quantity available for processing will not be available until a much later date. The quantity needed for seeding the 1946 crop has been estimated on the basis of the best information available but cannot be

TABLE II. — Indicated Soybean Production, Estimated Quantity Available for Processing and Estimated Processing Capacity, Selected States, 1945-46 Season.

State	Indicated production Oct. 1, 1945*	Estimated Seed requirements for 1946***	Estimated quantity to be fed to livestock†	Assumed use for full-fat flour and for export as beans††	Estimated quantity available for processing 1945-46	Estimated processing capacity as of Oct. 1, 1945‡
	1,000 bushels					
Delaware	**	102	29		**	91
Illinois	73,062	5,497	571	3,904	63,090	59,526
Indiana	28,640	2,868	694	1,530	23,548	15,659
Iowa	36,195	2,965	852	1,938	30,440	29,282
Kansas	2,612	181	83		2,348	3,087
Kentucky	975	314	66		595	5,387
Michigan	1,815	200	207		1,408	1,069
Minnesota	6,460	339	304	342	5,475	2,383
Missouri	10,770	819	212	580	9,159	5,392
Nebraska	**	26	22		**	2,158
New York	**	29	110		**	5,013
North Dakota	**	4	17		**	528
Ohio	22,591	2,537	741	1,206	18,107	22,801
Pennsylvania	**	215	143		**	223
South Dakota	**	10	13		**	495
Wisconsin	676	181	110		385	1,452
Other States	12,791	3,019	713		8,339	§
United States	196,587	19,306	4,887	9,500	162,894	154,546¶

*Bureau of Agricultural Economics.
**Not reported separately.
***Based on 95 percent of 1944 acreage of soybeans for all purposes, and usual seeding rate as reported by B.A.E.
†Same as reported for 1944 by B.A.E.
††Assumed that 2 million bushels will be used for full-fat flour for domestic and foreign consumption and that 7.5 million bushels will be exported as beans and that the beans used for these purposes will originate in the six states shown in proportion to their total production.
‡Based on 330 days operations and includes only that capacity in operation on October 1, 1945. (Table I.)
§Capacity in "Other States" is mostly in cottonseed and peanut oil mills and is not shown here although it is greatly in excess of needs.
¶Does not include capacity in "Other States."

LOCATION OF SOYBEAN OIL MILLS IN OPERATION AND UNDER CONSTRUCTION, BY TYPE OF EQUIPMENT OCTOBER 1, 1945, BY SELECTED STATES

considered as being more than an approximation.

It was estimated that the quantity that would be fed to livestock would be about the same as that which was reported as being fed out of the 1943 crop during the 1943-44 season. This figure does not reflect the quantity of beans used by mixed feed manufacturers or the quantity fed by farmers on whose farms beans were not produced and must be considered inadequate to the extent that beans were used for these purposes. The total quantity of beans used for feeding livestock from the 1945 crop will probably be substantially less than the quantities so consumed during the war years of extreme protein shortages.

In arriving at the quantity of beans to be used for the production of full-fat flour for domestic and foreign consumption and for export as beans it was assumed that 2 million bushels would be needed for the first use and 7.5 million bushels for the second use. Both these figures are subject to revision and especially the latter which represents a compromise between 5 and 10 million bushels, a range within which it is generally believed the quantity exported will fall. While the foreign demand for soybeans is greatly in excess of 10 million bushels it seems unlikely that any larger quantity will be exported. In any case the uncertainty of international conditions and changing policies at home make any estimate subject to substantial revision. One other factor which makes an estimate of the quantity of beans available for processing into oil and meal uncertain is that those beans which are lost as a result of deterioration, rodents, shrinkage and other factors cannot be accurately determined. Such losses are not likely to be large, however, in relation to total production.

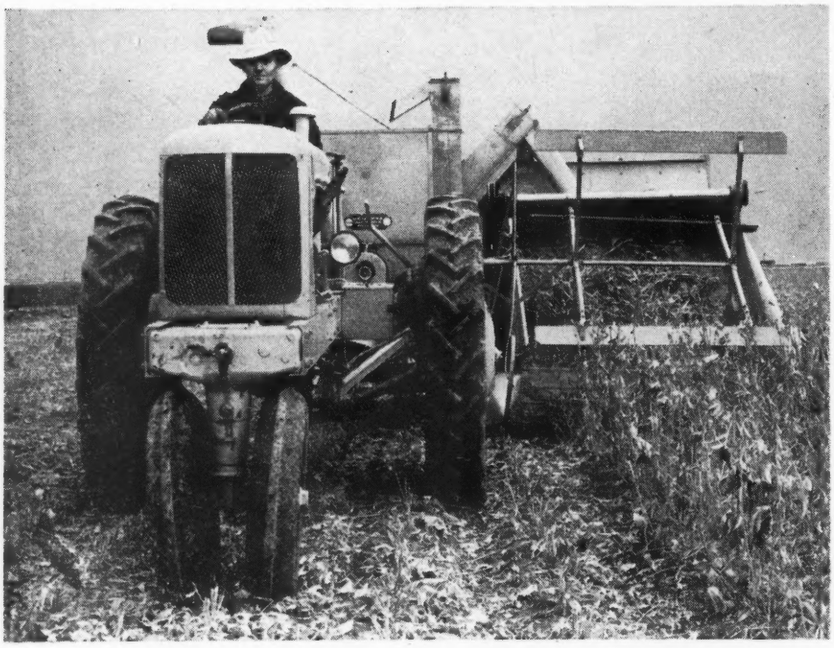
Subject to the above conditions it has been estimated that approximately 163 million bushels of beans will be available for processing out of the 1945 indicated crop. Probably 157 million bushels of these will be available in the states for which a capacity of 155 million bushels is shown. With approximately 16 million bushels of additional capacity under construction, essentially all of which should be completed during the 1945-46 season, *it seems likely that capacity will exceed the available supply of beans.* This will be particularly true if substantial quantities of beans are moved to the Southern states to be processed in cottonseed oil mills.

THE MILLS INCLUDED

The mills included in this study are intended to represent all those whose soybean operations were a substantial part of their total operations in the states shown during the 1944-45 season and will continue to be during the 1945-46 season (see map). With two or three exceptions the total capacity of all the mills included was actually devoted to processing soybeans during the 1944-45 season and will be during the 1945-46 season. While an effort was made to get a complete list of the mills in operation, in operation and with additional capacity under construction, and those under construction as of October 1, 1945, the list cannot be considered infallible. If there are any omissions they are accidental and not intentional. A very large number of vegetable oil mills in states other than those with which this article is concerned processed soybeans from the 1944 crop and will process beans during the 1945-46 season. Some will crush only soybeans, but most of them will also process cottonseed or peanuts, or both. For this and other reasons, they have not been included in this study.

—sbd—

Only six soybean strains out of a total of 3,000 tested at the Iowa Station in the period from 1937 to 1942 were sufficiently promising to warrant further trial, reports *Farm Science Reporter.* These selections will probably not be released as varieties but will be used as parents in the attempt to breed their desirable qualities into new varieties.



Contribution of POWER MACHINERY

● *In spite of more intensive cultivation the labor needed to produce a bushel of soybeans is only one-fifth what it was in 1920, due mostly to the use of power. Mr. Massey is a free lance writer and former editor of* IMPLEMENT AND TRACTOR.

By GEORGE F. MASSEY

IT WAS fortunate for the American soybean industry that the combination of the grain harvester and thresher into one field-operating unit, known as the combine, came along when it did. Without such a machine the soybean could never have advanced by such leaps and bounds into the very middle of our agricultural picture. Except those who know soybean cropping methods, few realize the combine's vital part in that contribution.

From the start of soybean production in this country, planting and tillage have never offered major difficulties. The American farm equipment industry had the tools already at hand; it remained only for experimentation to adapt those tools to the solution of the problems in tandem. It worked. With modifications dictated by agronomic tests and practical field experience, it has been working ever since.

As an Irish farmer once said, facts are hard to pin down so they'll stand up. It is often hard to say with historic exactitude, for instance, just who did a certain thing first in any area of activity.

Who, for example, first demonstrated on our native soil that the narrow-row method of planting and cultivating soybeans —a method more and more widely used through the years of advancement—had great merit? At least one of the firsts in this respect involved a man, a mule, a small grain-drill and a Georgia stock in the southwestern corner of Tennessee 30 years ago.

The man, now prominent in the soybean industry as superintendent of the new Ralston-Purina soybean mill in Kansas City, Mo., is G. Heartsill Banks, not only a processing industrialist, but an agricultural scientist who has had much to do with the development of new methods in the production of crops in the upper cotton belt, especially soybeans and rice.

In 1915 young Mr. Banks was just out of Missouri University's agricultural department with an appropriate degree and his first job as teacher of his favorite subject at Colton College, a few miles outside Memphis, and with a consuming eagerness to demonstrate anything that needed demonstration on Colton's experimental acres.

IMPRESSIVE POTENTIAL

Unlike many agricultural heads at the time, his head was full of the impressive potential that seemed to lie within the skin of that attractive stranger from the Orient, the soybean. He had the idea that the closer you set the rows, with room enough left for effective tilth, the better the crop would do for itself and the farmer.

So he blocked off every other hole of the college's grain-drill and planted his soya seed. That set the rows 16 inches apart. It was too close for easy cultivation with the facilities then at his command. There were no rotary hoes. He had to proceed with what he had.

Then he shortened a singletree, attached it to a Georgia stock with a single heel-sweep, attached the college's mule to the singletree and said. "Giddap!" With the traces so close together the cooperative animal no doubt felt a cramp in his style; there was no cramp in the over-all result of the test.

This experimental crop turned out well. In one way or another and with better equipment Heartsill Banks has been testing things that way throughout his professional and business life.

His 30-year-old experiment with the grain-drill, the heel-sweep and the handicapped mule is typical of the many ways in which the growth of soybeans and modern farm equipment, on a larger scale, have been adapted to each other so ingeniously. In more recent years, even the geneticist has been breeding for soybean qualities that lend themselves more readily to the cultivating and harvesting operations.

Designing engineers at the implement factories are fully alive to the importance of producing soybeans of high quality at low cost and work in full cooperation with the agricultural engineers, agronomists and variety breeders at the experiment stations. No group is more logically interested in the prosperity of the soybean industry than the farm equipment manufacturers.

Progression from one good machine to a better characterizes the general pattern of advance in the field of farm equipment. This is generally true in other fields. The agricultural engineer-designer, at work on unending experiment and development in the factory research laboratory and out under the hot sun, is farm equipment's key man. He is always pressing toward something better.

Though it resulted from the marriage of the grain harvester to the grain thresher, the combine happens to have had a truly revolutionary effect. Yet, in itself, it is an outgrowth of mechanical evolution.

In the beginning the combine emancipated the broad-acreage grower on the big end of the wheat belt from the expense, labor and confusion of the annual thresh-

ing crew and from other costs and effort incident to cutting, shocking and stacking, to all of which the women of the wheat-grower's household were authentic martyrs.

For a good many seasons it was believed to be thoroughly impracticable to spread the use of the combine into the eastern areas where smaller acreages and more diversified farming prevailed. For the eastern farmer the big machine was just something to think about as a marvel of power farm equipment; for the western grower, often committed exclusively to wheat, it was something to buy and use as a practical solution of his large-scale production problem.

PHENOMENAL RISE OF SOY

Not until the phenomenal rise of the soybean east of the Mississippi did the farmer in that region begin to think of the combine as something he, too, could actually use. When the machine made the west-east crossing of the river skeptics, of course, received it with hoots.

Since the combine is one of the outstanding power machines, it is plain that it could not have come into widespread use ahead of the modern farm tractor, although early harvester-threshers of enormous size were operated in the Far West and Northwest by horse-traction alone. It took almost a herd of horses to pull one of them over a great wheat ranch.

Certainly the soybean belt could never have been served by the combine without the tractor. Now the self-propelled combine, in all its up-to-date array of rubber tires and expert design, has entered the scene and, with the war behind us, will effect even larger economies with adequate factory production.

Essentially it is a one-man outfit built around a tractor. It short-cuts the whole harvesting operation. Many soybean growers hail it and are eager to use it when the time comes, perhaps a season or so after V-J Day. Unless current signs mislead, there will be a long line of growers forming on the right to get their orders in for the new automotive combine.

During the original application of the combine to the soybean harvest it was soon found that the crop could be handled with a high degree of efficiency by slowing down the cylinder. This was done at first through improvisation, such as rigging up a jack-shaft to reduce speed. Measures of the kind were discarded as cumbersome and time-consuming. Today any good combine can be adjusted in a jiffy to the job of harvesting soybeans or a hundred other small-grain, bean and seed crops.

Big combines did so much for big growers in the winter wheat area and elsewhere that demand arose for smaller combines to perform similar service for farmers with smaller acreage. Manufacturers were quick to respond. Indeed, they foresaw the demand before it was voiced to any considerable extent.

Refinement of design came with the new machines; their improvement emphasized adjustability of seeds and screens. The giant combines took their place where they belonged, in the regions of big wheat production; their little brothers, cutting a swath from a few feet to more generous widths, according to the scale of the buyer's operation, carried combine service into areas where it had been considered out of the question.

Use of power and power machines in soybean production has, within a quarter-century, reduced labor per acre by one-third, although this saving has been influenced somewhat by other factors. At the same time, because of increased yields resulting from improved facilities and methods, labor per bushel is only about one-fifth what it was in 1920. All this has been accomplished in the face of the fact that good practice requires more intensive cultivation for weed control than was formerly thought necessary.

Without inviting charges of exaggeration, it can be said that the combine, developed in the first place for heavy wheat harvesting, has turned out to be, also, the savior and promoter of the soybean-grower's great and reliable cash crop. It opened the only clear way to get the beans to market in mature condition. Before the combine came to the rescue—which is the correct word—the way had been blocked.

Once open, that new way offered every incentive to farmers all over the Cornbelt and farther south to expand soybean production to its present impressive total. Without the combine such expansion would have been impossible.

Prior to the advent of this machine most growers had to depend primarily upon the grain-binder which was ill-adapted to the requirements; it merely started a series of operations that were extremely wasteful in handling such a valuable product.

UNCONTROLLABLE FACTOR

In pre-combine days, moisture content was the then uncontrollable factor that the soybean man had to fight. For some years it baffled him. It was of paramount importance that the crop be threshed when its moisture content was lowest and therefore safest for storage. Under 14 percent was and is considered fairly safe; 11-to-13 percent is safer. A wet harvest could easily result in something like disaster.

With the old binder-thresher attack no control could be had over moisture content. Soybeans had to be threshed when it was "convenient," not when it was timely. They could be cut on time, but in the shock they would often absorb almost twice as much moisture as marketable soybeans should hold.

Even when the weather favored a perfect cure the loss through operational complexity often averaged almost 30 percent; in fact, the better their condition, under such unavoidable handling, the more they shattered.

All this was saved and greatly simplified when the combine entered the soybean field. When the standing crop was tested and found dry enough, it could be cut and immediately threshed inside the same unit. That had been the problem to be solved. Today its combine-enabled solution is taken as a matter of course. But in that other day many regarded it as too simple and quite beyond belief.

Soybean Oil Meal for BEEF CATTLE

• This is the sixth of a series of eight special articles by well-known nutrition authorities on feeding livestock and poultry.

By W. E. SIMONSEN
Member Soybean Research Council

AMERICAN livestock have for years suffered from protein starvation. This has, in many cases, resulted in small profits or even financial losses from feeding ventures. It has been much easier for the feeder to evaluate the different feeds that might be given the laying hens or the dairy cows when the eggs could be counted each day or the milk weighed twice a day than it is with beef cattle where the gains are seldom known until the cattle go to market.

As a result, cattle feeders after years of costly experience have found that they produced good gains when using a certain formula and they are very reluctant to change the formula because of the difficulty of measuring the comparative value of other feeds. Changing amounts of various available feed supplies make it necessary or more economical to change feeding formulas from time to time.

With the present limited supply of some protein oil meals and the comparative liberal supply of soybean oil meal, many cattle feeders are finding it desirable to use soybean oil meal as the principal protein supplement for feeding beef cattle. Such use, based on a knowledge of the characteristics of soybean oil meal and substantiated by considerable experimental work, is proving to be profitable to many cattle feeders.

One of the first things to note in the use of soybean oil meal for feeding cattle is that cattle learn to like it so well that they will often select it in preference to other ingredients in the ration unless it is thoroughly mixed with the grain or silage. It is also good practice at the start of the feeding period to use soybean oil meal with the grain to avoid excessive protein hunger. Properly balanced rations promote normal feeding and maximum gains.

It is good business to feed soybean oil meal whenever cattle are eating corn, corncob meal, corn silage, corn fodder or any corn product. The technical reason for this is the low protein content of corn products and the fact that soybean protein combines especially well with corn protein. This may be the underlying reason for the exceptional value of soybean oil meal for use in rations for growing and fattening beef calves. When soybean oil meal is added to a cattle ration containing corn, less feed is required per unit of gain than when a ration is made up of less efficient proteins.

Remarkedly good results have been observed when small to moderate amounts of soybean oil meal were used in combination with corn or some corn product. The Nebraska North Platte Sub-Station report (Mimeographed Circular No. 7) on comparative values of protein feeds for steer calves, shows that one pound of soybean oil meal per day with silage had a feeding value 5.7 times that of alfalfa hay—that is, when alfalfa hay was worth $10 per ton, soybean oil meal had a feeding value of $57.50 per ton.

COTTONSEED AND SOYBEAN

Purdue Agricultural Experiment Station reported steer feeding trials September 13, 1939, in which steers fed shelled corn, silage, clover hay and salt with one lot receiving 1½ pounds cottonseed meal per day and another lot receiving 1½ pounds soybean oil meal per day. The steers receiving the soybean oil meal made $8.27 more profit per head than those receiving cottonseed meal when the cost of the two kinds of protein supplements was the same per ton.

Another interesting lot in this same report received the same basic ration as above but with ¾ pound soybean oil meal per head per day. This lot of steers made $4.92 per head more profit than the cattle receiving 1½ pounds per head of cottonseed meal per day and within $3.35 per head as much profit as those receiving 1½ pound soybean oil meal per day. These figures indicate that in most cases the use of ¾ pound to 1½ pounds per

steer per day of soybean oil meal is very practical and profitable.

Rex Beresford, reporting in Iowa Farm Economist for July, 1944, estimated that land producing at the rate of 70 bushels of corn per acre would yield the corn, clover, hay and corn silage sufficient to produce 781 pounds of beef per acre if 1½ pounds soybean oil meal were fed per animal per day. If the margin on the cattle is used to pay for the soybean oil meal and the 781 pounds of beef sold for 14½c per pound, the return would be $109.34 per acre; this is truly a remarkable return for land use.

When we calculate the amount of corn, corncob meal, corn silage, corn fodder and other corn products available for cattle feeding in the Cornbelt states and the increased returns to be secured by adding soybean oil meal, the total figures become astronomical. The proper selection of feeds and use of proper feeding methods determine the success or failure of individual feeders. Our national welfare depends on a general adaptation of good feeding practices.

★ BOOKS ★

INDUSTRIAL OIL AND FATS PRODUCTS, by Antone E. Bailey, Interscience Publishers, Inc., New York, 735 pages. Price $10.

The author of this comprehensive work is senior technologist, Southern Regional Research Laboratory, New Orleans La., and is well known to scientific research workers.

This volume is intended to be primarily a text on oil and fat technology. The greater part is devoted to a description of and discussion of the commercially important oil and fat products and the processes used in the manufacture of these products. These are treated in four sections: The nature of fats and oils, raw materials, industrial utilization and processes used.

Among other products, cooking and salad oils, shortening, bakery products and confections, soaps, paints, and varnishes are covered.

Historical background is given of the shortening and margarine industries, both of them important to soybean producers. Shortening is an American invention that grew out of the cotton raising industry originally, although large meat packers had a hand in it. It is interesting that the shortening people first offered shortening as a lard compound, but were wise enough to quit offering it as an imitation of lard. The vegetable shortening manufacturers have been active in devising methods for improving the product, until at present time it is in better favor than lard due, the author believes, in part to superior physical properties.

RESEARCH

(Continued from page 11)

beans based on their past experiences in farm management.

It is frequently said at this time that corn is a more profitable crop than soybeans to the grower. Let us assume that 5 million acres now devoted to growing soybeans were planted to corn in addition to the acreage now alloted for corn. In an open, free-trading market it could have the effect of depressing the corn price on the entire crop and thereby possibly placing it in the class of an unprofitable crop. It is not the purpose of this article to argue which crop is more profitable to the farmer to grow, that is, soybeans, corn, wheat, oats or other grains. The grower knows that an over-production of any one item in normal times will undermine the price structure for that crop.

It is expected that American growers will continue to plant 10 million to 11 million acres of soybeans annually. The soybean processing industry believes in the future of soybeans in the crop-rotating plan on American farms, and is investing large sums of money in new type (solvent extraction) plants which will permit a better price return to the grower for his soybeans. Some of these plants are already in operation, some are under construction and others are planned, merely awaiting release of construction materials and manpower.

If the grower shares the processor's confidence in the future of this new and important industry, and if all work together on the farms, in the mills, and in the research laboratories, the position of the soybean will be maintained and improved in the national economy.

★ PUBLICATIONS ★

CULINARY PREPARATION AND USE OF SOYBEANS AND SOYBEAN FLOUR, by Ferne Bowman, Leta Maharg, Margaret Mangel and Maxine McDivitt, Bulletin 485, Missouri Agricultural Experiment Station, Columbia, Mo.

Say the authors: "The purpose of the investigation reported in this publication is to present suggestions, precautions, and tested recipes for the use of soybeans which are now being grown in Missouri and of soybean products available on the retail market. We have included only recipes rated as excellent by the judges."

Green soybeans, sprouts, dry mature soybeans, meat extenders and soya grits and flours are covered by the bulletin.

The judges found the dry mature beans which were cooked by steam pressure for 20 minutes superior to those cooked from 2½ to 3 hours in a partially covered sauce pan. They rated the Bansei, 81044-Select, Higan and Funk Delicious mature beans as very good, and found the Boone and Illini field varieties only fair when compared with vegetable types.

SOYBEAN SEED PRODUCTION IN MISSOURI, by B. M. King, Circular 300. 12 pages. Missouri Agricultural Experiment Station, Columbia.

The circular covers soil treatment, varieties, culture and harvesting.

Soybean production has increased rapidly in recent years in Missouri, the state standing fifth in the U. S.

Since much of Missouri land is highly rolling the author recommends growing the crop only on slightly rolling or level land where erosion is not a problem. "There are," he says, "some three and one-half million acres of heavy clay bottom lands and rather shallow claypan upland types well adapted to soybeans that do not meet fully the requirements of such crops as corn and alfalfa. By growing the beans in the conventional 3 and 4-year rotations, this would provide annually about 1 million acres free of erosion hazards that could be used for the crop."

THE EFFECT OF VARIOUS ADJUVANTS TO THE DIET OF RATS ON THE CHANGES IN BODY FATS INDUCED BY FEEDING SOYBEAN OIL, by J. A. Schultz and B. H. Thomas, Iowa Agricultural Research Bulletin 336, Ames, Iowa, 1945.

A report of two experiments in rat feeding made for possible light they may throw on the soft pork problem. It has been established that rats tend to deposit fats in much the same manner as do fattening hogs. Attempts were made to modify the character of the body fat of rats receiving soybean oil in their diet.

INHERITANCE OF NUMBER OF SEEDS PER POD AND LEAFLET SHAPE IN THE SOYBEAN, by Wayne E. Domingo, *Journal of Scientific Research*, Vol. 70, No. 8, Washington, D. C.

A highly scientific discussion of the genetic factors involved.

Data were obtained from 26 crosses, indicating that number of seeds per pod, while somewhat influenced by environmental conditions, is largely governed by a few major and several minor genes.

—sbd—

Immature soybeans, caught by the first freeze, should be harvested for grain if the pods are filled even though the beans show a green tinge. And it will probably pay to harvest some beans that are even less mature, in the opinion of E. S. Dyas, extension agronomist at Iowa State College.

Research...THE FORERUNNER OF AN INDUSTRY

Through foresight and pioneering, backed by painstaking research and development, the A. E. Staley Manufacturing Company has been a leader in the Soybean Industry for the past quarter of a century. Staley's research laboratories are working constantly to develop new products and to improve present products. The opening of the new laboratory, now in construction, will greatly expand these facilities.

Having increased their operations through the years in proportion to the increased supply of beans, the new Solvent Extraction Plant at Decatur has increased Staley's production of Soybean Oil Meal to more nearly meet the requirements of Staley customers.

Staley's has always maintained the highest quality in their Protein Feeds and other products, through a continuous program of research and laboratory control.

The Staley Customer NEVER GUESSES—He Knows!

A. E. *Staley* MANUFACTURING COMPANY

(Feed Division)

DECATUR, ILLINOIS PAINESVILLE, OHIO

USDA MEN WHO HAVE CONTRIBUTED TO SOYBEAN DEVELOPMENT

★ ★ ★

O. E. MAY

AMONG the men who have made valuable contributions to the development of the soybean is Dr. O. E. May, chief of the Agricultural Research Administration's Bureau of Agricultural and Industrial Chemistry.

Born and reared in a farming section of northeastern Iowa, now one of the leading soybean-producing states, Dr. May has spent most of his life searching for industrial outlets for farm products. It was the industrial fermentation work carried on by Dr. May and associates at Department of Agriculture's old Arlington Farm, Va., that supplied the background experience that enabled the Northern Regional Research Laboratory at Peoria, Ill., which Dr. May formerly directed, to increase the yield of penicillin so that it could be put into immediate large-scale commercial production.

It was this same background experience that caused him to be selected to head the Bankhead-Jones Soybean Industrial Products Laboratory at Urbana, Illinois. He was its first director, and served from March 9, 1936, to August 16, 1938. In this short time he assembled a staff of investigators of marked scientific attainments and established for the laboratory a place of high regard with the state agricultural experiment stations as well as the soybean and chemical industries.

When the laboratory was established there was urgent need for more information on the chemistry of beans and on the chemical and physical properties of their constituent materials. Information was needed on the protein and oil contents of the different varieties, as well as on the composition and properties of the proteins, phosphatides, oil, minerals, and carbohydrates. Plant breeders needed to know more about the grain varieties being crushed for oil, and more about the effect of rate, date, and method of planting on yield and composition. Farmers needed to know what grain varieties are best adapted for industrial purposes. These are some of the problems that the laboratory tackled while Dr. May was directing its activities. They have not all been solved, to be sure, but considerable and very worth-while progress is being made. The laboratory's pilot-plant equipment enabled it to carry promising test-tube research to the semi-commercial production stage where it can be properly evaluated.

Research on the industrial utilization of soybeans is still carried on under Dr. May's general supervision at the Bureau's Peoria Laboratory, where that phase of the work was transferred by an act of Congress in 1942. The agronomic work is conducted at Urbana and at cooperating state agricultural experiment stations.

Dr. May insists that any accomplishments attributed to him are due even more to the work of the men who have been associated with him. These include such men as R. T. Milner, W. B. VanArsdal, W. H. Goss, K. S. Markley, G. H. Brother, and A. K. Smith, now employed in the Regional Research Laboratories, J. L. Cartter and W. J. Morse of the Bureau of Plant Industry, Soils, and Agricultural Engineering, as well as persons connected with the agricultural experiment stations and the soybean industry.

May feels that the successful results of soybean research in the last 10 years have been due largely to cooperation and teamwork among the various individuals and agencies interested in the constructive development and expansion of the soybean industry.

Soybeans are used now largely for food products because of the war, but when the war is over it is hoped that new and wider outlets and markets will be developed in both the food and the industrial fields.

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TWO-COUNTY BEAN MEETING

Possibility of organizing a one or two-county crop improvement association was discussed and a committee appointed to investigate its desirability at a meeting of interested soybean growers at Bowen, Ill., October 11.

The committee consisted of Carlin N. Morton, chairman, Bowen; Earl White, Bowen; and Harold E. Huey, Plymouth. Counties represented were Adams and Hancock.

L. L. Norton, Hancock County farm adviser, discussed soybean diseases and their control.

Twenty-six out of the 35 soybean growers present were producers of certified Lincoln seed.

Orchids for September

I've just had the chance to look through your September annual issue, and I want to congratulate you on an excellent job. Since I'm in the same publishing business, I can appreciate the amount of hard and intelligent effort that goes into an issue of this size and excellence. You and your coworkers deserve a lot of credit.—Fred R. Brockhagen, *Pacific Coast Review,* San Francisco.

I want to compliment you upon the big review number of postwar soybean industry. . . I know enough about special issues to know they are hard to compile and mean real work. Your publication is indispensible to the grower and processor of soybeans.—E. R. McIntyre, information specialist, U. S. Department of Agriculture, Washington, D.C.

Let me congratulate you on the convention issue of the *Soybean Digest.* You certainly did an excellent job.—J. L. Cartter, senior agronomist, U. S. Regional Soybean Laboratory, Urbana, Ill.

We all want to congratulate you on the annual 1945 edition—it is splendid.—W. L. Burlison, head Department of Agronomy, University of Illinois.

Nice job on the annual edition. You did an all around swell job.—O. N. LaFollette, secretary Feed Institute of Iowa, Des Moines.

Let me compliment you on the fine annual edition. It is interesting from beginning to end.—Edward J. Dies, National Soybean Processors Association, Chicago.

Congratulations on your September number. You surely have given the folks plenty of interesting reading matter. The make-up, printing and colors all show in fine style.—W. R. Anderson, publisher *Flour & Seed,* Milwaukee, Wis.

Orchids for the September *Digest* are in order. A really swell piece of work. Can you spare me five extra copies?—G. H. Banks, Ralston Purina Co., Kansas City, Mo.

I think this edition of the *Digest* the best ever. It covers such a wide range of topics, all of prime interest to the soybean industry.—S. D. Hollett, Swift & Co., Frankfort, Ind.

Very frankly, I was amazed when I received and went through the September issue of the *Soybean Digest* and saw what a well published and all inclusive magazine this is.—Paul K. Myers, executive secretary of the Waterloo (Iowa) Chamber of Commerce.

EDITOR'S NOTE—Copies of the September issue are still available, and are being given with new subscriptions.

DEMONSTRATION BY INTERNATIONAL

It is the conviction of the International Harvester Co. that inevitable advances in farm technology will demand an increasingly great variety of specialized tractors and attachments rather than a single farm tractor with a single system of tools, visitors were told at the demonstration staged by the firm at their experimental farm at Hinsdale, Ill., October 15.

The show was both an exhibit of postwar machines and a pageant of farm implement progress throughout the past century. The full line of Harvester machinery was on exhibition.

1945 Soybean Yield Is Below Past 2 Years

The November report of the USDA crop reporting board places the national soybean production at 190,646,000 bushels, 6 million below the October estimate and almost 12 million bushels below the board's estimate of September 1. The 1945 crop is still the third largest on record, being exceeded only by 1943 and 1944 production.

Indicated average yield is 18 bushels per acre.

Early frosts caused some damage but the major reasons for the drop from a month ago were small beans and poorly filled pods, the crop report says. *Digest* correspondents state many wide variations in yield in the same locality have occurred. More disease damage than last year, particularly in Illinois, is reported.

Producers are adopting a "wait and see" attitude toward 1946 acreage, pending announcement of the government's program.

Estimated production in major soybean states:

Ohio, 20,808,000; Indiana, 28,640,000; Illinois, 71,280,000; Michigan, 1,870,000; Wisconsin, 676,000; Minnesota, 6,460,000; Iowa, 34,290,000; Missouri, 9,693,000; Kansas, 2,850,000; Virginia, 1,632,000; North Carolina, 2,262,000; Kentucky, 910,000; Tennessee, 1,155,000; Mississippi, 1,131,000; Arkansas, 4,125,000.

November 1 reports of *Digest* correspondents follow:

ARKANSAS

Jacob Hartz, Stuttgart, for east central: 40-50% crop harvested. Yield one-third less than 1944, caused by too much rain during late August and September. Heavy field damage due to rainy weather. Beans grading No. 2 and 3. More disease and insect damage than last year. Protein concentrate situation rather tight.

Tildon Easley, extension agronomist, Little Rock: 35% harvested. Yields considerably better than 1944. Storage facilities inadequate in parts of state. Protein concentrate situation not too good. Unless a considerable drop in price will probably be a large acreage again next year, since this year's acreage giving good returns.

ILLINOIS

J. E. Johnson, Champaign, for Champaign and adjoining counties: 98% harvested. Actual yields very much lower than earlier estimates. Would expect yield to be around 22-23 bu. Plenty of water damage. Practically no frost damage other than very late reseeded spots. Disease damage very heavy. Grading is good. Moisture content ranges 11-14%, preventing much of split damage of former years. Heavy weed infestation. Farmers will use own judgment as to cropping in 1946. Promises of past haven't created an attitude conducive to reducing acreages even though they know price will be lower. Thousands of bushels of finest Lincolns have gone to market. Have the opinion there isn't too large a supply of many of our best varieties kept for seed. Disease situation appears to be most prevalent with Illini. This is natural as a larger acreage of this variety and men naturally put their high priced seed in best land and gave it the best care. Heroic effort being made to bring Illini back to its original purity as no bean has the record of long and continued good performance as this variety.

Frank S. Garwood & Sons, Stonington, for south central: 75-80% harvested. Slight frost damage on very late beans. Considerable damage from disease. Beans grading mostly No. 1-2. Very few receiving top premium as moisture content has been around 12%. Railroad car problem in movement to market. Yields most variable ever recorded. Run from below 10 to over 40 bu. per acre, with probable average of 20-21 bu. Conclusion definitely drawn by all farmers that soybeans following soybeans not nearly so good as soybeans following corn or other crop. Difference very marked

this year. Date of seeding and soil fertility have had more to do with yield variation than variety. Later sown soybeans have yielded better on average than early sown soybeans, though this about first year this ever happened.

Walter W. McLaughlin, Decatur: 90% harvested. Yields 20% below 1944. No frost or field damage to speak of but very serious damage from disease. Many fields that looked like should yield 30 bu. per acre yielded around 20 bu. We are at loss to explain wide variation in yields. Beans grading No. 2 or better. Average price $2.07-.09 per bu. Likely will be a decrease in acreage in 1946.

J. C. Hackleman, Department of Agronomy, University of Illinois, Urbana: 85-90% harvested in central and north, 50% in south central. Yields probably down about 1 bu. per acre average under 1944. Beans not damaged by weather except in south central. There delayed planting caused late harvest and some damage is expected. Season for harvesting has been ideal to date. Spotted reports of damage from disease. Less insect damage than last year. Quality has been good. Not many reports of dockage. Moisture content 10-12%. Unless definite request by government backed by guaranteed price at least as high as this year many growers will reduce 1946 acreages.

INDIANA

Clark L. Baker, State AAA, Indianapolis: 90% harvested. Yields about 4% higher than earlier estimates. Little frost or field damage except on late planted acres. Disease damage least ever reported. Beans grading very good. Crop being handled in good shape except for car shortage on a few railroads. Protein concentrate situation was good until local mills shut down a few weeks ago. Is improving again according to recent reports. Soybeans harvested are dry and in good condition generally. Late planted soybeans due to flood conditions in May and June were principal problem.

J. B. Edmondson, Clayton, for south central: 100% harvested. Yields about 10% lower than 1944 due to shorter growth and smaller beans. Weeks of rainy, humid weather, just previous to harvest caused lowered quality, some sprouting in pod. Mosaic and pod blight evident in most fields. Top pods affected most. Beans grade practically all No. 2, with moisture gradation from 16%-11%. Farmers here consider soy acreage permanent in rotation. Expect about same acreage in 1946. Your demand for more and better research devoted to soybeans well taken. This fall I have been bombarded with questions from growers as to cause of so many retarded-growth beans. In more than one instance, acres failed to mature normally in one spot or along one side of field, for no apparent reason so far as drainage, tillage or fertilization was concerned. Also many questions about scattered bean vines with stunted abortive growth. It was from these green, immature plants that we got the white, moldy beans that lowered the quality. Whether the trouble is caused by fungus, mold, virus or some plant food deficiency — and I've heard all of these suggested — is still problematical. Certainly somebody, thoroughly competent, should be given the go-sign on such problems that have been with us for years and years.

K. E. Beeson, Indiana Corn Growers Association, Lafayette: One-half harvested. Estimated yield 24% greater than 1944 crop. Less than 1% frost damage. Considerable moldy beans due to wet weather during maturity. Beans grading generally good. Weedy soys have slowed combining. Weather fine right now but several weeks of favorable weather needed. Protein concentrate situation still tight.

IOWA

Howard L. Roach, Plainfield, for northeast: 80% harvested. Soybeans did not yield as well as expected. Average 20 bu. per acre. Slight weather or disease damage. Beans grading No. 1. Concentrate situation tight. Need more animal and vegetable protein. Farmers will await announcement of support prices before deciding on 1946 acreage. Twenty-five cents per bu. will drop the soy acreage 25% if other grains remain at existing prices.

O. N. La Follette, Feed Institute of Iowa, Des Moines: 70% crop harvested. Yield varies by areas but approximately 95% of 1944. Very slight damage by weather or disease. Beans grading No. 2 or better. Moisture 11-12.4%. Protein concentrate situation tight but relief in sight soon. Gen-

eral attitude toward 1946 acreage depends on Washington and enlightenment of farmers on "balanced agricultural" program.

John Sand, Marcus, for northwest: Practically all harvested. Yields 20% lower than 1944. Beans very good quality with exception of very late planted beans. Season ideal for harvesting past 3 weeks and most soys have gone into bins in nice shape. Most growers have gone to earlier soys such as Richland and Earlyana. Even though yield was considerably lower than last year was considered satisfactory due to extremely late and wet season. Talk favors marked decrease in 1946 unless support price remains favorable.

A. J. Loveland, State AAA, Des Moines: 95% harvested. Yields 95% 1944. 5% weather damage. Beans grading No. 1 and 2. Protein situation not good at present. General attitude toward 1946 acreage good but will take lot of work to duplicate 1945 acreage.

KANSAS

E. A. Cleavinger, extension division, Kansas State College, for eastern: 40% harvested. Previous yield estimates approximately right. At least 95% will escape frost damage. 5% disease injury. Will not be many low grade beans. Serious protein shortage. In 1946 acreage will hold equal or slight increase over 1945.

MINNESOTA

John W. Evans, Montevideo, for southwest central: 65% harvested. Yields okey. Many 20 bu. yield reports. Very little weather damage. More lodging and more weedy fields than usual. Beans grading No. 1, 9-11% moisture. Price $2.10. Soybeans satisfactory crop in this area in 1945. More profitable than flax on average, more dependable as cash crop than corn.

W. G. Green, Lakefield, for southwest: 100% harvested. Quite a few beans frosted but dried so could be harvested. Beans grading No. 1. All in all crop very satisfactory. Farmers realizing lot of money from crop. Have just paid a customer about $4,000 for his beans and he was very much pleased. I believe acreage will be increased next year.

MISSOURI

E. M. Poirot, Golden City, for southwest: 30% harvested. Yields 10-20 bu. per acre. some drouth damage. Beans show high moisture.

Harry A. Plattner, Malta Bend: 75% harvested. Yields about 15% under 1944. Most beans grading No. 2 or better. Average moisture about 12.5%. Buying price to growers $2.06. Yield will be about 20 bu. on all varieties with Lincolns slightly above. Very little if any concentrate available to livestock feeders. If support price is maintained at or about present price acreage will remain same or increase.

J. Ross Fleetwood, extension specialist, Missouri College of Agriculture, Columbia: 85% harvested. Yields 10-15% below 1944. Some frost damage. Beans grading about normal. With record rainfall during first 6 months of year, the driest July and August on record and wettest September for years combined to make very unsatisfactory season. Yields surprisingly good under circumstances.

NEBRASKA

Nebraska Crop Report: Harvest of soybeans nearing completion. Some have done very well considering late planting.

J. C. Swinbank, College of Agriculture, Lincoln, for east: 65% harvested. Average yields from contest fields running 5-6 bu. per acre less than average in 1944. Yields in principal producing counties ranging from 11 to 30 bu. with average about 19 bu. Very little frost damage. Low yields due to late planting and drought during August and September. All beans seem to qualify for top price. Lowered 1946 acreage anticipated. Nebraska has 51 growers of certified Lincolns this year. Present indications are they will have 10,000 to 12,000 bu. of certified seed available. Lincoln seed was distributed as prizes in the state yield contest last year.

Fremont Meal & Cake Co., Fremont, for

eastern: 95% harvested. Drought cut yields. Very little frost or field damage. Soybeans grading mostly No. 2. Moisture 11% and under. Richland soybeans planted as late as July 12 matured with less than 10% frost damage. Yields on July planted beans run from 10-20 bu.

OHIO

Marsh Foundation Farms, Van Wert, for west central: 80% harvested. Yields below earlier estimates due to dry weather during August and early September. Some field damage in early varieties which stood in fields during heavy rains of late September-early October. Grading fairly satisfactory. Moisture low. 1946 acreage depends on prospective price, especially as related to price of corn. Lincolns are proving themselves in all respects. Higher yields, stand good, do not shatter but combine easily. Seems to be increasing demand for Earlyana and Richmond to precede wheat in the rotation.

G. G. McIlroy, Irwin, for central: 95% harvested. Yields generally lower than 1944 except for Lincolns. Some drought damage at end of season which cut prospective production. No material disease or insect damage came to our attention. Major part of crop very dry and probably 40% brought $2.10 at local elevator. Size of 1945 beans definitely smaller. We can expect in this particular section a pronounced demand for Lincoln seed for next year's seeding and a trend toward row planting such as we have not seen before. I look for definite curtailment in 1946 acreage but farmers not talking about it much yet.

D. F. Beard, department of agronomy, Ohio State University, Columbus: 50-60% harvested. Yields better than 1944. Frost caught small percentage of crop cutting yields on that fraction. Wet weather causing some spoilage though not serious yet. Beans grading good so far. Less acreage will be planted in 1946 unless support price is maintained or increased. Even then, less.

D. G. Wing, Mechanicsburg, for central: Harvesting just about cleaned up. Some report 25 bu. yields, but more are less. August and September drought cut yield. General attitude toward 1946 acreage will depend on price guarantee.

SOUTH DAKOTA

Rock Island Railroad: Soybeans suffered some frost damage, but crop is becoming established in southeastern part of state and increased acreage expected in 1946.

WISCONSIN

Geo. M. Briggs, agronomist, Madison: 60-80% harvested. Yield better than earlier estimates but not as good as 1944. Northwest Wisconsin 7-15 bu. per acre. Southern 15-30 bu. Had excellent drying weather for soybeans. Frost damage 5-25%. Beans grading No. 1 and 2.

John P. Dries, Saukville, for lake shore and eastern: 75% harvested. Yields below normal. Frost damage shows on late plantings. Some green beans. Beans grading No. 2 or better. Writer's own crop of row planted Mukdens harvested Oct. 29 yielded 28 bu. per acre. Best quality ever.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of The Soybean Digest, published monthly at Hudson, Iowa, for October 1, 1945.

State of Iowa
County of Black Hawk ss.

Before me, a notary public in and for the State and county aforesaid, personally appeared Kent Pellett, who, having been duly sworn according to law, deposes and says that he is the Managing Editor of The Soybean Digest, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher: The American Soybean Association, Hudson, Iowa.

Editor: George M. Strayer, Hudson, Iowa.

Managing Editor: Kent Pellett, Hudson, Iowa.

Business Manager: Jeanne M. Strayer, Hudson, Iowa.

2. That the owner is: The American Soybean Association, Hudson, Iowa.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

KENT PELLETT.

Sworn to and subscribed before me this 9th day of October, 1945.

ROBERT STEWART.

(My commission expires July 4, 1948.)

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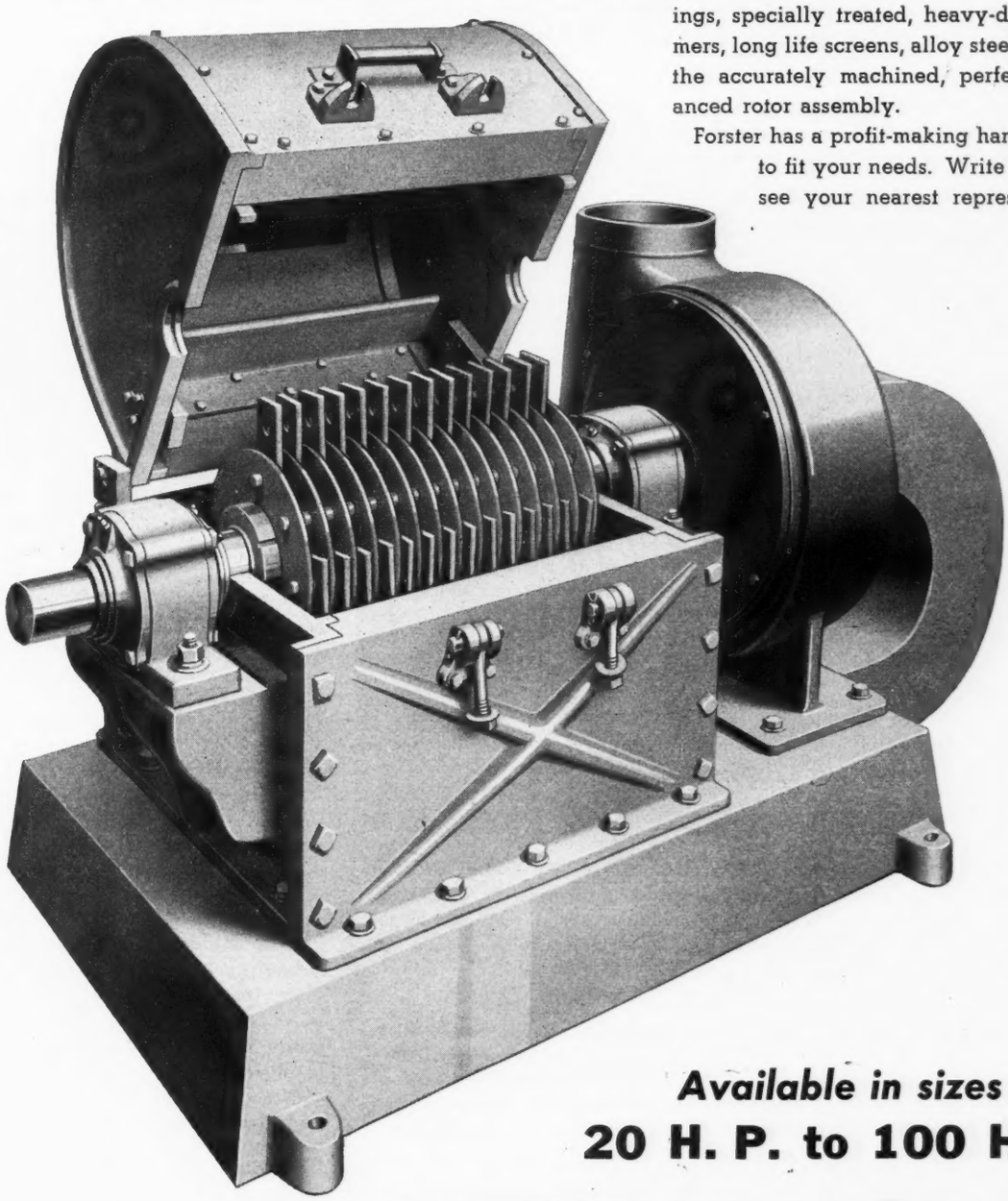

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THE MATTHIS COMPANY, 57 Post Street, San Francisco, California.
HARRY STOVER, 207 Commercial Bldg., Sherman, Texas.
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Machines for Modern Milling

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GRITS and FLAKES... FROM THE WORLD OF SOY

George K. Dahlin has been admitted to partnership in the firm of Roesling, Monroe & Co. of Chicago, vegetable oil brokerage office owned by Carl H. Smith, the firm announces. Mr. Dahlin has been associated with the firm for 11 years.

* * *

C. E. White, manager of Wilson Feed & Seed Co., Wilson, Ark., announces plans to install a solvent extraction plant with a capacity of about 100 tons. The plant crushes soybeans, now operating two French screw presses.

* * *

Yields of seed cotton per acre have been increased by 205 pounds after soybeans were turned under for soil improvement, reports the Arkansas Cotton Branch Experiment Station.

* * *

Construction of a new 400-ton daily capacity commercial feed plant at Lima, Ohio, is announced by M. A. Lehman, vice president of Pillsbury Mills. Pillsbury's feed mills division with headquarters at Clinton, Iowa, will operate the Lima property, which is scheduled to go into operation next spring.

* * *

Stanley H. Burchfield is the new manager of Honeymead Products Co.'s processing plant at Washington, Iowa. He has been in the company's sales department at Spencer, Iowa, during the past 2 years.

* * *

Northwest Cooperative Mills has taken over the soybean processing plant at Menomonie, Wis., built and operated since last December by the Farmers Union Central Exchange. A reinforced concrete storage tank with a capacity of 113,000 bushels is being completed. Addition of another mechanical screw press will double the handling capacity so the plant will be able to handle 400,000 bushels of 1945 crop soybeans.

* * *

Lecithin, made from soybeans, is said to be a good aid to inhibitors which prevent growth of bacteria in gasoline, reports PETROLEUM WORLD. *Such bacteria may damage gasoline in storage. These effects may be counteracted by the presence of inhibitors. Lecithin because of its bulky molecules hinders the diffusion of oxygen and oxidation products in the gasoline*

* * *

Baltimore & Ohio Railroad has issued another Ohio soybean map showing estimated 1945 soybean production in the nine crop reporting districts reached by the B & O, and also the location of elevators. "The intensive program begun several years ago by the Baltimore & Ohio to encourage production of only the *oil-rich* varieties of soybeans continues," states O. K. Quivey, B & O's manager of agricultural development.

* * *

Washington Cooperative Farmers Association, Seattle, and the Cooperative G. L. F., Ithaca, N. Y., have leased the Portland and Milwaukee processing plants respectively of Archer-Daniels-Midland Co. Insufficient supplies of flaxseed with which to keep the plants operating was the reason for leasing them, the firm announces. It is understood that both plants will be switched to soybeans by the lessees.

* * *

West Tennessee Soya Mills, Inc., Tiptonville, Tenn., is erecting additional soybean storage bins to double its present capacity.

* * *

Pillsbury Mills, Inc., has appealed from the decree of the District Federal Court in Chicago in a suit brought by Soy Mills, Inc., for alleged acts of unfair competition and technical copyright label infringement on a griddle mix containing soy flour, reports *Northwestern Miller.*

* * *

A. Roger Hook, Janesville, Wis., has been named manager of Janesville Mills, Inc., a soybean processing plant under construction and assumed his new duties November 1. Ralph Wells, head of Ralph Wells & Co., Monmouth, Ill., will act as general manager for the Janesville plant.

ZIES ELECTED BY V. D. ANDERSON CO.

The V. D. Anderson Co. of Cleveland, Ohio, manufacturers of Anderson Expellers, Anderson Super - Silvertop Steam Traps and steam specialties, announces the election of the following officers: Carl W. Zies, president; R. T. Anderson, vice president; A. D. Anderson, treasurer; F. S. Freer, asst. treasurer; B. D. Coffey, secretary and Edward Parsons, asst. secretary. A. D. Anderson is now chairman of the board of directors.

Carl W. Zies, newly elected president, has been with the company for 16 years. He came to The V. D. Anderson Co. to take over the management of the steam specialties division and was later made general manager of all divisions. The Super-Silvertop Steam Trap, as well as many Expeller improvements, have been developed under his supervision.

—sbd—

DIES TO HEAD PROCESSOR, SOY FLOUR BOARDS

Edward J. Dies, Chicago, was elected chairman of the board of the National Soybean Processors Association at a recent meeting of the directors and will represent the industry in Washington. He is succeeded as president of the Association by his assistant, R. G. Houghtlin, formerly of Ralston Purina Co.

Mr. Dies also has been elected chairman of the board of the Soy Flour Association for which he will likewise continue to direct policy. R. G. Brierley, Minneapolis, will succeed him as president, and A. E. Leger, Chicago, will become executive secretary November 1.

For the past 2 years Mr. Dies had sought to shift his duties as president of the two groups to carry out other plans but agreed to accept the chairmanship of the two organizations of which he has been executive head for nearly 10 years.

It is in that decade that the soybean industry has risen from a 30 million dollar a year business to a 500 million dollar business. Members of the National Soybean Processors Association represent 95 percent of the total regular soybean processing capacity, and range from various small cooperative units to some of the

largest corporations in their respective fields. The Soy Flour Association represents more than 90 percent of total production.

Officers point with pride to the fact that under leadership of Mr. Dies there never has been conflict with any government agency, and relations have been uniformly harmonious with competitive industries despite the great expansion of the soybean industry. The same industry policies, it was stated, will be retained.

—s b d—

NEW SOYBEAN PLANT AT MANKATO, MINN.

S. M. Archer, president of Archer-Daniels-Midland Co., Minneapolis, has announced plans to build a new feed concentrate mixing and soybean processing mill at Mankato, Minn. The new plant, to be located on the north outskirts of Mankato on Highway No. 169, will be known as the Mankato mills division of Archer-Daniels-Midland Co.

Besides the mixing and processing plant, elevator space will be built to provide room for 500,000 bushels of soybeans and feed ingredients.

It is contemplated that the plant will be finished shortly after the first of the year. General manager of the Mankato mills division will be P. L. Kimble. Assisting him will be H. R. Harmer, in charge of the office; L. B. Frenz, mill superintendent; H. B. Winchester and E. H. Burmeister, in charge of sales and sales promotion; E. T. Cashman, manager of feed manufacturers' service department.

The management has had many years' experience in the concentrate business and is well known to the feed trade.

—s b d—

SEED PROMOTED BY CARGILL, INC.

Cargill, Inc., announces the election of Fred M. Seed as vice president in charge of the feed and oil division of the company, with headquarters in Minneapolis

Mr. Seed's career with Cargill began in March 1932, soon after completion of his formal education at the University of Minnesota. He was selected to manage the Cleveland branch office during the Great Lakes shipping season of 1934. Later that year he assumed the responsibility of opening and managing a new Cargill office in San Francisco, returning to Minneapolis early in 1935. He became general manager of the feed and oil division in 1942. In 1944 Mr. Seed was made an assistant vice president.

WASHINGTON Digest

Program Hangs Fire Positive action on 1946 goal and price support for soybeans is currently blocked by administrative indecision and uncertainty over price policy.

Key log in the jam holding up major farm policy decisions is settlement of the Administration's wage-price policy.

Another uncertainty is what Congress will do, if anything, about support prices —whether it will insist on price supports at 100 percent of parity next year; whether the parity price formula will be revised upward to achieve the same result.

The issue of 100 percent of parity price supports has been raised by grower and congressional demands that the price floor for peanuts be held at about the present level next year.

Should the peanut growers' request be granted, the Administration contends it would have to support the prices of other farm commodities at the same parity level. This, it maintains, would stir up more trouble on the wage-price front.

Thus far, Secretary of Agriculture Anderson has refused to commit the Administration to price floor *guarantees* on crops produced next year above the 90 percent of parity level provided for in the Steagall amendment.

There will, of course, be some commodities supported at a higher level than 90 percent of parity—crops such as soybeans which Anderson feels are still needed in larger than normal quantities.

But agitation for full parity floors on 1946 crops continues in Congress. It centers around two measures.

One is the Bankhead amendment to the price stabilization act which expires next June. This requires the President to use all lawful means to support the prices of "basic" and "Steagall" commodities at 100 percent of parity or better. There is considerable sentiment developing in Congress to extend the provision beyond next June.

The other is the bill by Congressman Pace (D., Ga.) to raise parity prices by including labor costs. On some commodities, the Pace parity formula would boost farm parity by 31 percent.

The parity issue may not be threshed out before next spring. While its settlement may have an influence on prices of crops harvested next fall, Secretary Anderson can't wait beyond end of the year to make up his mind on price policy for soybeans.

HAVE MADE UP MINDS

Actually, USDA officials have about made up their minds as far as soybeans are concerned. They are thinking—and have tentatively proposed—in terms of a somewhat lower soybean acreage (probably under 10 million acres), and of a price support between $1.70 and $1.75 a bushel.

The proposed drop from the present price support of $2.04 a bushel is about the amount of the subsidy Commodity Credit Corporation now pays to soybean processors so they can purchase at the floor price.

The soybean subsidy averages about 30 to 35 cents a bushel. It was started Sept. 22, 1943. Its purpose was to insure higher returns to growers, to induce soybean production in marginal areas, and to increase the supply of vegetable oils needed for war.

Annual cost has been running about 48 million dollars. OPA estimates the annual gross saving at 120 million dollars. If price ceilings were removed, and prices to producers were kept at the present level, OPA figures the price of refined soybean oil at the factory would have to go up about 4 cents a pound, or 5.1 cents a pound on the soybean oil content of margarine, shortening, and cooking and salad oils at retail.

The question of when price ceilings on fats and oils will be removed isn't settled. But most officials here doubt that soybean ceilings will be continued beyond next June 30 when the price stabilization act expires.

The proposed withdrawal of the soybean subsidy, meaning a lower return to producers, would pave the way for removal of soybean price ceilings.

The lifting of ceilings, however, wouldn't necessarily mean a higher producer return. Soybean product prices would have to climb the full amount of the present subsidy before any advantage over 1945 prices could be felt.

OIL PRICES TO STAY UP

Fats and oils economists here expect prices of soybean oil to remain high throughout 1946 and early 1947. If price ceilings are lifted next year, they look for a further advance in the price of soybean oil.

But they are a little bearish about the price of soybean oil meal. They think oil meal prices might even decline moderately toward the end of next year because demand for livestock feed is apt to be somewhat weaker as a result of lower returns to poultry and dairy producers.

The Bureau of Agricultural Economics says that a decline of $1 a ton in the price of soybean meal reduces the value of a bushel of soybeans by 2.4 cents.

In this connection, BAE reports: "The

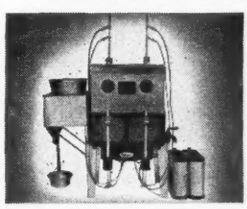
a MOISTURE TESTER *for Every Need*

Ask Seedburo to solve your moisture testing problem. For 33 years this organization has studied moisture questions... has accumulated a vast fund of "know how" . . . is known as the "center of information" about moisture analysis. It will study your requirements and make suggestions. Its recommendations are unbiased because it offers a wide selection of testers . . . one for every need.

Steinlite ONE MINUTE TESTER

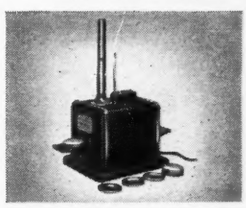
An experienced operator can make a moisture test with the Steinlite in one minute; almost any operator in two or three minutes. For production work as well as laboratory. ACCURATE—calibrated against official oven methods. EASY TO USE—operator requires no technical training. Works on radio frequency impedance principle. More in use than all other electrical moisture testers combined. Tests wide variety of products—whole grain, mixed feeds, meal, cottonseed, nuts, etc. New applications being found regularly. Sold on 10-day free trial basis. No money down. Standard Grain Unit $275.00. Special Models $325.00.

BROWN-DUVEL, . . . *old well known - reliable*



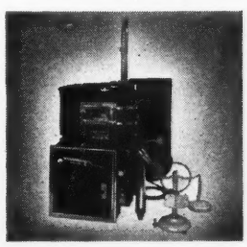
One of the oldest and best known testers. Especially suited where the volume of samples is small. Available to test 1, 2, 4 or 6 samples at once. Illustration shows two compartment tester with automatic electric shut-off; $120.00. Extra accessories available. For whole grains only.

CARTER-SIMON- *For Laboratory Tests on all materials*



A small, rapid drying oven which reduces laboratory testing period to a minimum. Precision built, absolutely accurate and reliable. Handles 3 samples at once. Total time for tests varies with product; for example malt, six minutes; wheat, fifteen minutes; sugar beet, thirty minutes. Price, complete with dishes and thermometer $150.00.

BRABENDER- *Semi-Automatic..the Modern Drying Oven*



An ideal combination of a modern drying oven and an analytical balance. Combines speed with the precision of analytical methods. Results are read from a scale in direct moisture percentages. No cumbersome calculations. Used in both laboratory and production. Drying time varies from 15 to 40 minutes depending upon commodity. No. 357 direct heat model $395.00.

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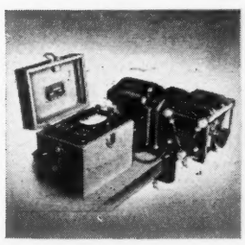

An electrical meter for whole grain only. Calibrated against the water oven for corn; against the air oven for other grains. Requires no weighing of samples. No. 91, complete, with both rolls and battery eliminator, $317.50. Available with only one roll at slightly lower cost.

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demand for high-protein feeds increased to unprecedentedly high levels during the war . . . A very large increase has occurred during recent years in the number of mixed feed manufacturers and in the volume of mixed feed produced. Much of this increase will be maintained in the next few years.

"The mixed feed industry is the most important group of purchasers of high-protein feeds, as such. The demand for mixed feeds will depend not only on livestock numbers (particularly milk cows and poultry) but on the cost of feed in relation to prices of livestock and livestock products, and on subsidy payments to livestock producers.

"If returns from livestock production become less favorable, the demand for mixed feeds (and high-protein feeds) will decline. Likewise, reduction in numbers of important high-protein consuming livestock, particularly poultry, would result in a decreased demand for high-protein feeds."

Slap on Ceiling OPA has slapped price ceilings on 1945 crop soybeans 2 to 3 months earlier than usual because new-crop beans had begun to sell over ceilings in some areas.

Early announcement of the new ceilings had been planned last spring when OPA and the Department of Agriculture worked out the price schedule, but there was a slipup along the line. The new ceilings, same as this year, are:

No. 2 green and yellow, 14 percent moisture, $2.10 a bushel; No. 2 brown, black and mixed, $1.90 a bushel.

The 5 cent a bushel allowance for handling at the country elevator, and the 2½ cent markup for merchandisers is continued. Fulfillment of contracts entered into before the order went into effect (Nov. 2) is permitted, as in the past. Soybeans sold for seed or human consumption aren't included in the new action.

Ban Whole Bean Feeding Because of the shortage of vegetable oils, the Department of Agriculture is planning to reinstate the order, in effect last year, to prohibit use of whole or ground soybeans in manufacture of feeds.

Purpose is to recover as much oil as possible by crushing. The order will be administered by the Fats & Oils branch of the new Production & Marketing Administration.

Jasspon to Resign W. H. Jasspon, head of the Fats & Oils Branch of PMA, is planning to resign as soon as Secretary Anderson can find a successor to him and return to Memphis, Tenn., where he has a large oilseed business.

Col. O. W. Herrmann, a native Nebraskan formerly with Farm Credit Administration, has been offered a top spot in the branch with the idea he would be groomed to succeed Jasspon. Herrmann, still in uniform, hadn't made up his mind to accept the post early this month.

—s b d—

PLAN MORE SOY OIL IN CHINA

Chinese authorities hope that the production of soybean oil in the first 5-year postwar reconstruction period will be increased from pre-war estimates of 1,800,000 metric piculs to 2,500,000 metric piculs (1 picul-133⅓ lbs. in China).

The goal for exports in the postwar period is 1,500,000 metric piculs, equivalent only to the highest annual pre-war exports, says a report to the Department of Commerce.

After the war it will be necessary to make improvements in pressing the beans and in extracting the oil.

In The MARKETS

STOCKS OF OLD CROP SOYBEANS ON FARMS OCTOBER 1
Reported by U.S.D.A. Crop Reporting Board
(1,000 Bu.)

State	1944	1945
Maine	—	—
New Hampshire	—	—
Vermont	—	—
Massachusetts	—	—
Rhode Island	—	—
Connecticut	—	—
New York	60	29
New Jersey	13	6
Pennsylvania	76	44
Ohio	549	561
Indiana	389	232
Illinois	704	714
Michigan	120	32
Wisconsin	42	18
Minnesota	133	87
Iowa	2118	852
Missouri	217	106
North Dakota	4	5
South Dakota	25	8
Nebraska	9	19
Kansas	58	66
Delaware	18	16
Maryland	26	14
Virginia	37	19
West Virginia	0	0
North Carolina	46	62
South Carolina	4	2
Georgia	2	2
Florida	—	—
Kentucky	4	8
Tennessee	9	10
Alabama	2	3
Mississippi	34	12
Arkansas	51	72
Louisiana	14	5
Oklahoma	1	1
Texas	0	0
Montana	—	—
Idaho	—	—
Wyoming	—	—
Colorado	—	—
New Mexico	—	—
Arizona	—	—
Utah	—	—
Nevada	—	—
Washington	—	—
Oregon	—	—
California	—	—
United States	4765	3005

• AUGUST FOOD PURCHASES. Production and Marketing Administration's report of agricultural commodities purchased during August for lend-lease, territorial emergency, Red Cross and other purchases.

Deliveries of food and other agricultural products by the U. S. Department of Agriculture during August, totaling 333,131,084 pounds, are the smallest recorded since those in the early months of lend-lease in 1941. The August total was roughly half as large as during July when USDA deliveries totalled 641,043,270 pounds.

Lend-lease deliveries, though continuing to show a substantial reduction from those of the previous month, again accounted for more than 50 percent of the total. Deliveries to the United Nations Relief and Rehabilitation Administration were second in volume.

Commodity (Lbs.)	QANTITY (Lbs.) August	January 1, thru August 31, 1945
Margarine	2,000,000	74,004,812
Shortening	7,633,400	10,562,548
Soybean Oil		5,056,726
Soybean Oil Meal	240,000	21,540,000
Soybeans		230,742,080
Soy Flour		10,840,000

• SOYBEAN INSPECTIONS 1944-45. Inspected receipts of soybeans have increased materially during the five years for which records are available, from a total of 33,280 cars for the crop year 1940-41 to 83,744 cars for the 1944-45 season just completed, according to inspectors' reports to the Grain Branch of the Production and Marketing Administration. Total inspections for the year 1943-44 amounted to 83,503 cars.

The quality of the 1944 crop was good, 88 percent grading No. 2 or better compared with 86 percent the year preceding. Ninety-nine percent classed as yellow both seasons.

September 1945 inspections totaled 765 cars, with 82 percent grading No. 2 or better.

Inspections of soybeans in September included the equivalent of

107 cars inspected as cargo lots and truck receipts equivalent to about 13 cars.

• SOYBEAN STOCKS. Production and Marketing Administration commercial grain stock report.

U. S. Soybeans in Store and Afloat at Domestic Markets (1,000 Bu.)

	Oct. 9	Oct. 16	Oct. 23	Oct. 30
Gulf Coast	485	468	291	291
Northwestern and Upper Lake			5	122
Lower Lake	83	1	423	2954
East Central	53	55	239	1814
West Central, Southwestern & Western	48	13	241	1453
Total current week	669	537	1199	6634
Total Year ago	1665	2132	4657	9790
Total North American Commercial Soybean Stocks				
Current week		537	1199	6634
Year ago	1905	2370	4886	10006

• OILSEED CAKE AND MEAL—The trading in oilseed cake and meal has been light due to the fact that the local mills are out of the market at the present time and are not offering for any position reports the Production and Marketing Administration of the U. S. Department of Agriculture. The soybean oil meal and linseed oil meal production was reported to be at or near capacity, but most of the crushers' output is sold up through December. The demand is urgent especially from the big feed manufacturers who are desperately in need of the oilfeeds to be used in their formulas. Some Argentine flax was reported to have arrived on the east coast and it was also reported that flax from the northwest had been shipped to the eastern crushers to be crushed with the Argentine flax for the eastern trade.

• STANDARD SHORTENING SHIPMENTS. By members of Institute of Shortening Mfgrs., Inc., in pounds.

October 6	9,935,323
October 13	11,213,152
October 20	10,866,624
October 27	11,705,485